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DRAFT FINAL

Site Closure Report

IRP Site 35c Former Diesel UST Site



March Air Reserve Base California

Prepared For

**Air Force Center for Environmental Excellence
Technology Transfer Division
Brooks Air Force Base
San Antonio, Texas**

and

**March Air Reserve Base
California**

August 1997



**PARSONS
ENGINEERING SCIENCE, INC.**

9404 Genesee Ave., Suite 140 • La Jolla, California 92037

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SITE CLOSURE REPORT
FOR
IRP SITE 35c FORMER DIESEL UST SITE
MARCH ARB, CALIFORNIA

Prepared for

Air Force Center for Environmental Excellence
Brooks Air Force Base, Texas

and

March Air Reserve Base, California

August 1997

Parsons Engineering Science, Inc.
9404 Genesee Ave., Suite 140
La Jolla, California 92037

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A	Final Closure Sampling and Analysis Plan for IRP Site 35c Former Diesel UST Site March ARB, California
B	Borehole Logs
C	Laboratory Analytical Results

SECTION 1

INTRODUCTION

1.1 OBJECTIVES AND SCOPE

During the past three years, March Air Reserve Base (ARB) has participated in the Air Force Bioventing Pilot Test Initiative Project sponsored by the Air Force Center for Environmental Excellence (AFCEE) at Brooks AFB, Texas. The project included conducting more than 135 *in situ* bioventing pilot tests at 48 Air Force installations throughout the country. These year-long tests were designed to collect data on the effectiveness of bioventing for the remediation of soil contaminated with fuel hydrocarbons (i.e., JP-4 jet fuel, diesel fuel, gasoline, heating oil, etc.). The tests were not part of a remedial action plan designed to reduce soil contamination to below regulatory soil cleanup standards. However, based on the success of these year-long tests, sites were selected by AFCEE for additional sampling to help support site closure. One such site was former diesel underground storage tank (UST) at Installation Restoration Program (IRP) Site 35c.

A one-year-long bioventing pilot test was concluded at the site with year-end sampling in June 1995. Since then, the pilot test system has continued injecting air into the subsurface. This site closure report has been prepared to support a closure recommendation for Site 35c. This recommendation is based on historic information as well as analytical results obtained through implementation of a site-specific closure sampling and analysis plan (SAP) (Parsons Engineering Science, Inc. (Parsons ES), 1997). The closure SAP was reviewed and approved by California Regional Water Quality Control Board, Santa Ana Region (RWQCB) staff prior to implementation. A copy of the SAP is provided as Appendix A. The closure SAP presented a plan for soil sampling and analysis to document the effectiveness of soil remediation at these sites and to demonstrate compliance with regulatory requirements for closure.

To facilitate site closure, the RWQCB has established criteria for defining "low-risk" sites. "Low-risk" thresholds for benzene, toluene, ethylbenzene, and xylenes (BTEX) in groundwater have been established. Attainment of these levels signifies that active remediation of groundwater is no longer required. Site groundwater was monitored quarterly for a year beginning in the winter of 1992/1993. No BTEX compounds were detected for each quarter including a period of high groundwater elevation (5.3 feet below ground surface [bgs]). Hydrocarbon-impacted soil may remain

in place if leaching analysis demonstrates there is no risk of site groundwater exceeding the "low risk" thresholds.

Site closure soil sampling was conducted approximately 21 months after completion of the one-year *in situ* bioventing pilot test. Soil sampling entailed drilling and sampling six boreholes including one borehole through the former tank bed. All laboratory test results for BTEX in soil were compared against conservative soil concentrations designed to protect underlying groundwater. No BTEX compounds were measured in site soils at concentrations that could cause underlying groundwater to exceed the established "low risk" levels. Although the maximum total extractable petroleum hydrocarbon (TEPH) concentration was 3,560 mg/kg, no residual fuel hydrocarbon target for groundwater has been established (RWQCB, 1996a). All of these results support site closure.

1.2 REPORT ORGANIZATION

This site closure report consists of five sections, including this introduction, and three appendices. Section 2 includes a site description, site history, and a summary of previous investigations and remediation activities. Section 3 is a description of closure sampling activities that were conducted at the site. Section 4 contains a summary of closure sampling analytical results and recommendations for site closure. References used for preparation of this report are provided in Section 5. Appendix A presents a copy of the closure SAP. Appendix B provides copies of the site borehole logs. Appendix C presents laboratory analytical data for site environmental and quality assurance (QA) samples.

SECTION 2

SITE DESCRIPTION AND HISTORY

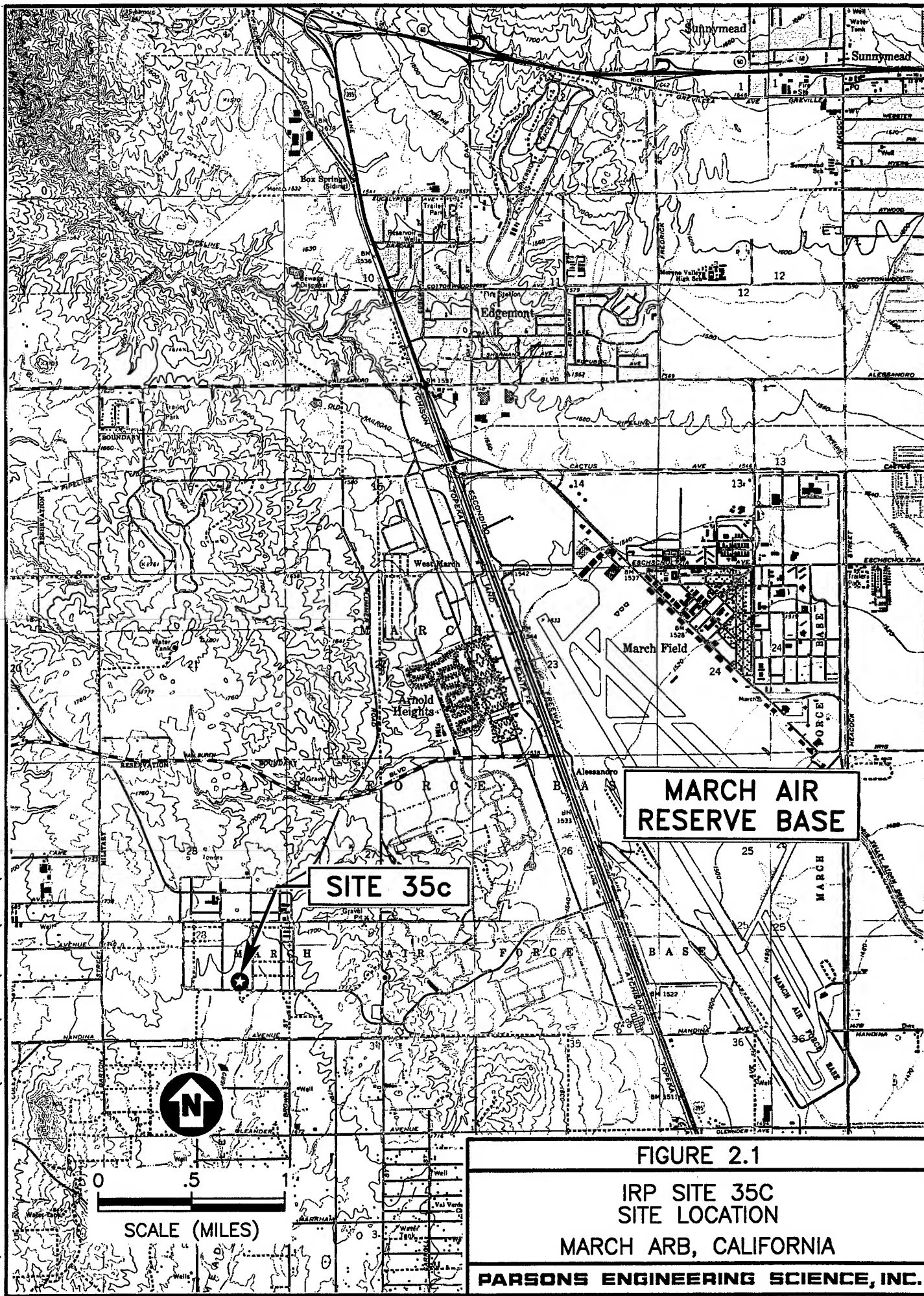
March ARB is located on approximately 7,000 acres in the northern end of Perris Valley in Riverside County, California. The base is located about 60 miles east of Los Angeles and 90 miles north of San Diego, California. March ARB is bisected in a northwest-southeast direction by Interstate Highway 215 (I-215) (Figure 2.1). East of I-215 is the Main Base where the air field and the majority of base facilities are located. This portion of the base lies on the relatively flat alluvium of Perris Valley. West of I-215 lies West March. This area is typified by gently undulating topography. Massive granite outcrops are common. The area is mostly undeveloped. Installation Restoration Program (IRP) Site 35c is located in West March.

March ARB opened on 1 March 1918 as the Alessandro Aviation Field. The base was a pilot training center during World War I. By 1938, March ARB was an Army bombing and gunnery training center. Camp Haan Army Base was constructed on what is now West March. As many as 80,000 personnel were stationed at Camp Haan at one time during World War II. After World War II, Camp Haan became March Air Force Base (AFB) and has served as a Strategic Air Command (SAC) bomber and air-to-air refueling operations base. The Headquarters 15th Air Force, located at March AFB, supervised SAC's western operations. The primary mission of the host unit, the 22nd Air Refueling Wing, was to maintain an effective air-to-air refueling capability. In September 1993, March AFB was designated by Congress as a realignment base. By 31 March 1996, all active duty personnel and aircraft were to be transferred (Tetra Tech, 1995a). March AFB was re-designated as March ARB and now supports Air Force Reserve activities.

The land uses adjacent to the base are a mixture of agricultural, residential, and commercial. Recently, significant residential development has occurred in the city of Moreno Valley, which is north and east of the base.

2.1 SITE DESCRIPTION

IRP Site 35c consists of a former 1,000-gallon diesel UST location east of Building 3406 (Figure 2.2). The building houses an emergency generator for the transmitter facility located at the nearby Building 3405. The generator is now supplied by an aboveground storage tank located immediately north of Building 3406. The entire compound is enclosed by a locked 7-foot-tall fence. The facility is located at the southern end of Dalla Avenue.



**MARCH AIR
RESERVE BASE**

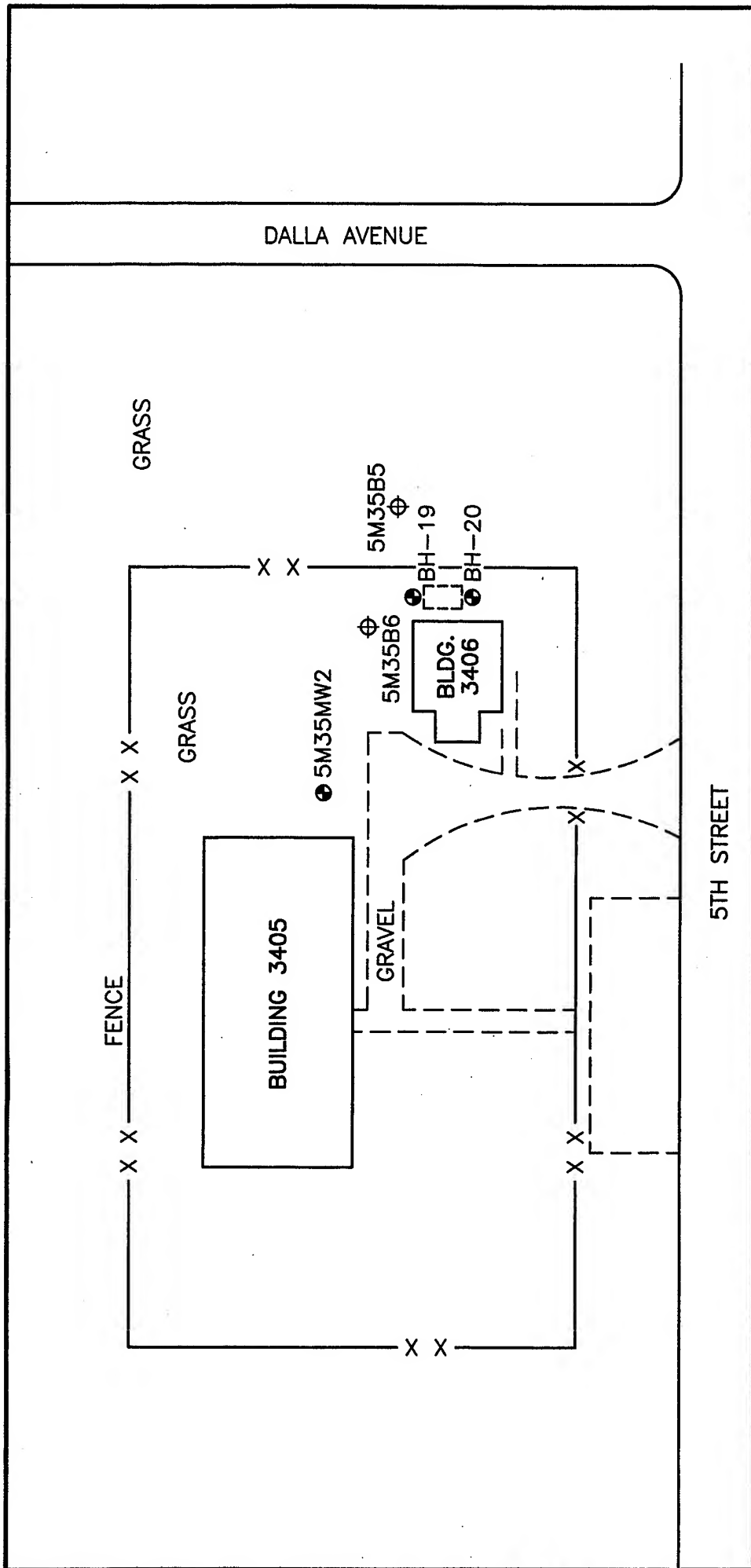
SITE 35c

FIGURE 2.1

**IRP SITE 35C
SITE LOCATION**

MARCH ARB, CALIFORNIA

PARSONS ENGINEERING SCIENCE, INC.



0 25' 50'
SCALE: 1" = 50'

LEGEND	
⊕	EARTH TECH SOIL BOREHOLE LOCATION
●	EARTH TECH MONITORING WELL LOCATION
[---]	FORMER 1,000 GAL. DIESEL TANK

FIGURE 2.2
IRP SITE 35C SITE LAYOUT
MARCH ARB, CALIFORNIA
PARSONS ENGINEERING SCIENCE, INC.

The former 1,000-gallon diesel UST was used to store fuel for an emergency generator located in Building 3406. Site information provided by March ARB was limited. The information did not include: (1) tank removal date; (2) the location, depth, and extent of the tank excavation; (3) the description of the backfill material; (4) the number, location, and analytical results of soil samples collected during tank removal (if any); or (4) the extent of contamination left in place.

2.2 SITE GEOLOGY AND HYDROGEOLOGY

Site 35c lies on the Perris Surface. This area is typified by Cretaceous and older crystalline rock outcrops with shallow soil cover. The granite rock of West March is often highly weathered at the contact with the soil cover. The thickness of the weathered zone is not known. Groundwater is often present in this weathered zone.

Subsurface conditions encountered during bioventing system installation (Parsons ES, 1994) and closure sampling included coarse sand from ground surface to about 2 feet bgs. Weathered granite was encountered at 2 feet bgs in all Site 35c bioventing-related boreholes.

Three groundwater wells, 5M35MW2, BH19, and BH20, have been installed at the site. Depth to groundwater in 5M35MW2 was monitored from January 1993 to March 1994. The depth ranged from 5.30 feet bgs on 4 March 1993 to 13.97 feet bgs on 18 January 1993. In March 1994, during bioventing system installation, groundwater was encountered at 13 feet bgs in the borehole for the vent well. Groundwater was encountered at 10.00 feet bgs during year-end bioventing testing in June 1995, and at 13.75 feet bgs during closure sampling in March 1997.

Because of the limited number of wells and their placement, accurate groundwater flow direction and gradient measurements have not been made. The groundwater flow direction is believed to be to the south, generally following the surface topographic slope (Tetra Tech, 1995b).

2.3 PREVIOUS INVESTIGATIONS

2.3.1 UST Survey 1988

In 1988, Lee Wan & Associates, Inc. conducted a UST survey at Site 35c. The survey included records searches, interviews with site personnel, visual site inspection, metal detector surveys, and field sampling of tank contents and surrounding soil. The survey indicated the UST at Site 35c had leaked (Tetra Tech, 1995a). Site analytical results are not known as the Lee Wan & Associates Report is no longer available from March ARB.

2.3.2 Site Investigation 1992

In 1992, Tetra Tech conducted a site investigation consisting of a geophysical survey, a soil gas survey, soil sampling, and groundwater sampling. The limited geophysical survey was performed to locate any previously undetected UST or the former

UST tank bed. The geophysical survey tentatively identified a backfilled tank pit near the northeast corner of Building 3406.

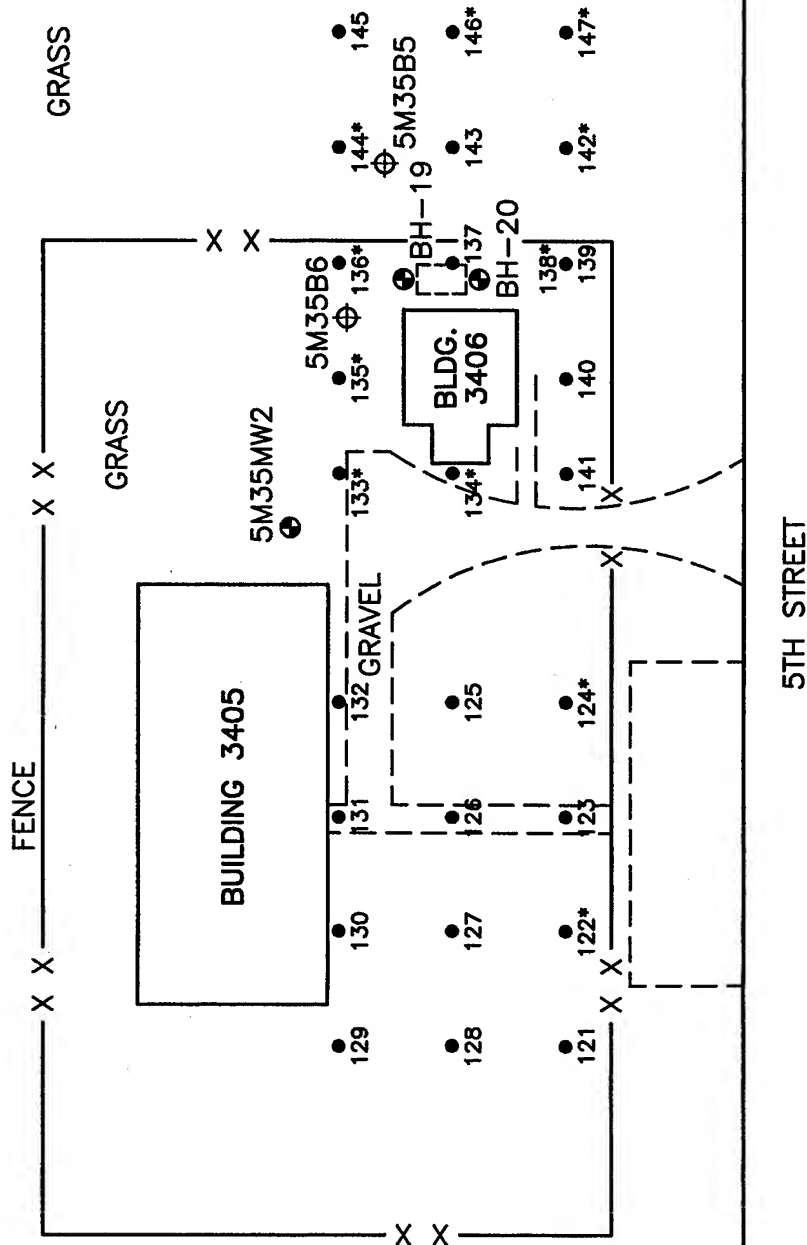
As part of an expanded source investigation, Tetra Tech conducted a soil gas survey at the site in 1992. Twenty-three points were sampled for organic compounds at depths between 2.5 and 4 feet bgs. Soil gas sampling point locations are shown on Figure 2.3. No organic compounds were detected in point 137 located closest to the former tank bed. Toluene and xylenes were detected in several soil gas samples (Figure 2.3). The mean soil gas concentrations for toluene and xylenes were $1.24\text{E-}08$ and $1.15\text{E-}09$ grams per cubic centimeter of air (g/cm^3), respectively. These soil gas contaminants were evaluated by comparing the dissolved concentration, at equilibrium with the measured soil gas concentration, with the 1994 U.S. Environmental Protection Agency (EPA) Region IX Preliminary Remediation Goals (PRGs) for tap water. Toluene and xylene equilibrium concentrations were below their respective PRGs and posed no risk to site groundwater (Tetra Tech, 1995b).

Soil samples were also collected as part of the 1992 investigation. Soil samples were collected at 5-foot intervals from 5 to 30 feet bgs in BH19 and from 5 to 40 feet bgs in BH20. Samples were analyzed by EPA Method SW8015 modified for gasoline, diesel, and motor oil. Analysis for diesel indicated concentrations of 696 milligrams per kilogram (mg/kg) and 5,320 mg/kg in samples from BH19, at 5 and 10 feet bgs, respectively. All other samples were non-detect.

Monitoring wells BH19 and BH20 were installed during the 1992 investigation. The wells are located immediately north and south of the former tank bed, according to 1995 Remedial Investigation report figures (Tetra Tech, 1995a). Depth to groundwater at the time of installation was 18.86 feet bgs in BH19 and 18.33 feet bgs in BH20. However, 1992 was near the end of a seven-year drought in southern California. Monitoring well 5M35MW2 was installed in early 1993. The water level increased after the heavy rains during the winter of 1992/1993 to 5.3 feet bgs. Depth to site groundwater as measured in well 5M35MW2 was 12.53 feet bgs during the last groundwater monitoring event on 29 March 1994.

Monitoring wells BH19 and BH20 were sampled in 1992. Samples were analyzed by EPA Method SW8015. Results indicated a concentration of 1.02 milligrams per liter (mg/L) of petroleum hydrocarbons in the motor oil range in BH19 only. Beginning in the winter of 1992/1993, BH19 and BH20 were sampled quarterly for one year. This included the period of highest site groundwater elevation (5.3 feet bgs) as measured in 5M35MW2. Samples were analyzed by EPA Method SW8260. All results were non-detect.

Beginning in the summer of 1993, well 5M35MW2 was sampled quarterly for one year. Groundwater samples were analyzed for volatile hydrocarbons by EPA Method SW8260. A chloromethane concentration of 5.0 micrograms per liter ($\mu\text{g}/\text{L}$) was detected in the summer 1993 sample. Data validation classified this as an estimated result. All other results were non-detect.



LEGEND

- ⊕ EARTH TECH SOIL BOREHOLE LOCATION
- EARTH TECH MONITORING WELL LOCATION
- [] FORMER 1,000-GAL. DIESEL TANK
- TETRA TECH SOIL GAS SAMPLING POINT
- * DENOTES ELEVATED SOIL GAS RESULTS

FIGURE 2.3

IRP SITE 35C
SOIL GAS SAMPLING POINT LOCATIONS
MARCH ARB, CALIFORNIA

PARSONS ENGINEERING SCIENCE, INC.

2.3.3 Bioventing: 1994-1995

Bioventing pilot testing activities were conducted by Parsons ES beginning in March 1994. As part of the pilot test, one vent well (VW) for injection of air into the subsurface and three soil gas monitoring points (MPs) were installed at the site. An additional background MP was installed approximately 0.5 miles from the site, midway between IRP Site 35c and another IRP site originally scheduled for pilot testing but canceled due to lack of contamination. VW and MP locations are shown on Figure 2.4 and in cross-section on Figure 2.5. The VW and MPA were to be located in the former tank bed, the location of which was obtained from previous site investigation documents. Because the project focus was on bioventing rather than site characterization, only limited sampling was performed. Three soil and three soil gas samples were collected from the VW and MPs. Analytical results are presented in Table 2.1. Detailed pilot testing procedures and results were presented in the bioventing results report (Parsons ES, 1994).

Initial testing indicated the extent of contamination is limited to a zone approximately 3 to 11 feet bgs and extends radially from the VW about 15 feet. Soil with the strongest field or laboratory evidence of contamination was located at 6 feet bgs in MPB. MPC, located 20 feet from MPB, had no field or laboratory evidence of contamination. Respiration tests indicated approximately 1,100 mg of hydrocarbons per kg of soil per year (mg/kg/yr) could be bioremediated. The air permeability test indicated that injecting air at a rate of about 12.5 standard cubic feet per minute (scfm) produced a zone of oxygen influence of at least 31 feet, which was beyond the extent of contaminated soil.

Long-term air injection at the site continued until May 1995. Year-end sampling completed in June 1995 indicated a 70 to 99.5 percent reduction in total volatile hydrocarbons (TVH), and a 92.5 to 98.4 percent reduction in ethylbenzene and xylenes in soil gas samples. Ethylbenzene and xylene concentrations were reduced to non-detect levels in a soil sample collected adjacent to MPB-6, the only initial soil sample with any detectable ethylbenzene and xylene contamination. Total recoverable petroleum hydrocarbon (TRPH) concentrations were reduced to non-detect levels in two of the three soil samples (Table 2.1). The 4-foot-deep sample from MPA had a TRPH concentration of 15.7 mg/kg. The year-end respiration test indicated a hydrocarbon biodegradation rate of approximately 960 mg/kg/yr. The relatively constant respiration rate most likely indicates TRPH was still being degraded at the time of the year-end test. Following year-end testing, the blower was restarted and continued to inject air into the VW until closure samples were collected in March 1997.

Quarterly groundwater monitoring results described in Subsection 2.3.2 and year-end bioventing test results have provided considerable information to support a no further remedial action determination and site closure. However, as previously described, site contamination originated from a former diesel UST. Although the VW and MPA were to be located through the former tank pit, none of these boreholes appeared to penetrate fill material. As shown on the cross-section, all bioventing-related boreholes penetrated first 2 feet of coarse sand, then weathered granite. The weathered granite was very dense and

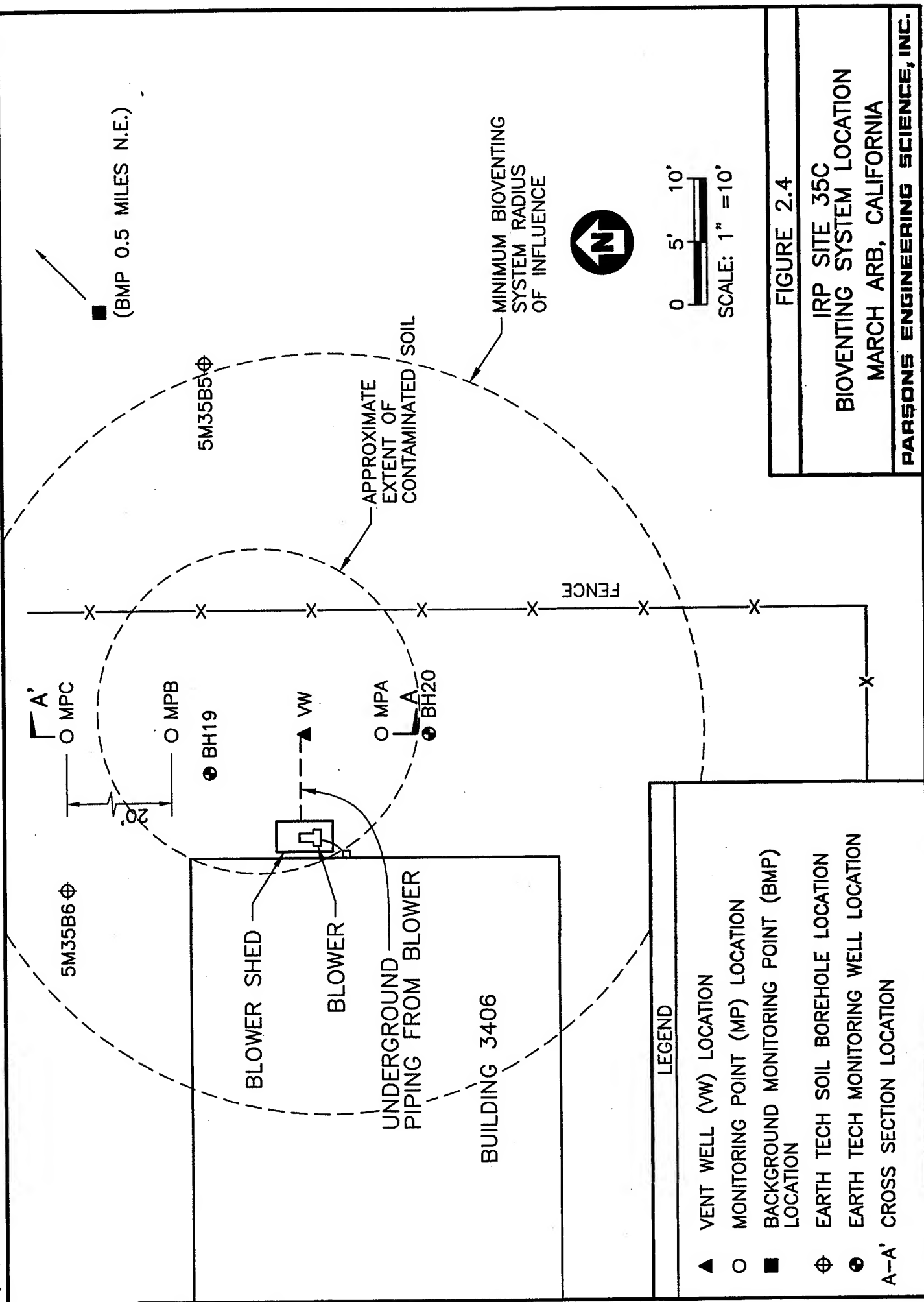


FIGURE 2.4

IRP SITE 35C
BIOVENTING SYSTEM LOCATION
MARCH ARB, CALIFORNIA
PARSONS ENGINEERING SCIENCE, INC.

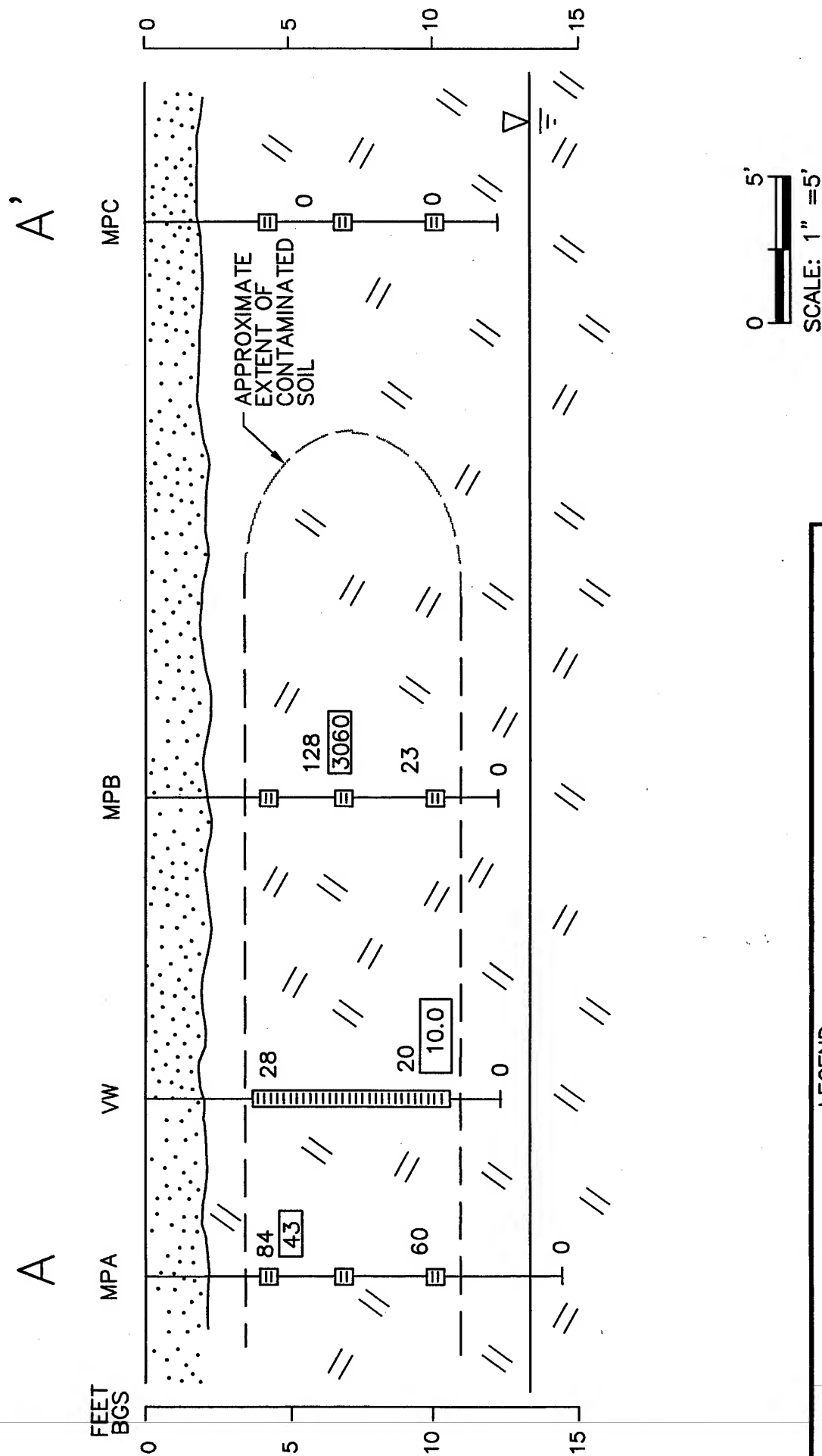


FIGURE 2.5

IRP SITE 35C
GEOLOGICAL CROSS SECTION
MARCH ARB, CALIFORNIA
PARSONS ENGINEERING SCIENCE, INC.

Table 2.1

**Initial and 1-Year Soil and Soil Gas Analytical Results
IRP Site 35c, Former Diesel UST
March ARB, California**

Analyte (Units) ^{a/}	Sample Locations-Depth (feet below ground surface)					
	MA1-VW		MA1-MPB-7		MA1-MPC-4	
	Initial ^{b/}	1-Year ^{c/}	Initial	1-Year ^{d/}	Initial	1-Year
Soil Gas Hydrocarbons						
TVH (ppmv)	85 ^{e/}	2.8	290	87	110	0.54
Benzene (ppmv)	<0.027	<0.002	<0.06	<0.003	<0.12	<0.002
Toluene (ppmv)	<0.027	<0.002	<0.06	0.003	<0.12	<0.002
Ethylbenzene (ppmv)	0.24	<0.002	0.92	0.015	<0.12	<0.002
Xylenes (ppmv)	0.34	0.008	1.6	0.12	<0.12	0.003
Soil Hydrocarbons						
	MA1-VW-9		MA1-MPA-4		MA1-MPB-6	
	Initial ^{b/}	1-Year ^{e/}	Initial	1-Year	Initial	1-Year
TRPH (mg/kg)	10	<9.98	43	15.7	3060	<9.99
Benzene (mg/kg)	<0.0006	<0.050	<0.0006	<0.051	<0.066	<0.050
Toluene (mg/kg)	<0.0006	<0.050	<0.0006	<0.051	<0.066	<0.050
Ethylbenzene (mg/kg)	<0.0006	<0.050	<0.0006	<0.051	0.15	<0.050
Xylenes (mg/kg)	<0.0008	<0.130	<0.0008	<0.130	0.48	<0.130
Moisture (%)	3.5	3.2	3.8	2.7	4.9	3.6

^{a/} TVH=total volatile hydrocarbons: ppmv = parts per million, volume per volume;

TRPH = total recoverable petroleum hydrocarbons; mg/kg = milligrams per kilogram.

^{b/} Initial soil gas samples collected on March 18, 1994.

^{c/} Final soil gas samples collected on June 16, 1995. Blower system was shut down approximately 30 days prior to soil gas sampling to allow soil gas to come to equilibrium with soils.

^{d/} Result averaged with duplicate sample.

^{e/} Initial sample at this location incorrectly reported as 8.5 ppmv in Interim Results Report, July 1994.

^{f/} Initial soil samples collected on March 15, 1994.

^{g/} Final soil samples collected on July 3, 1995.

appeared to be native and not backfill material. Because soil with the highest contamination is most likely associated with the former tank bed, closure boreholes were placed to identify this area of possible significant soil contamination.

SECTION 3

SITE CLOSURE SAMPLING ACTIVITIES

The purpose of this section is to summarize site closure and sampling activities including: borehole locations and sampling depths; soil sampling procedures; analytical methods used; and quality assurance (QA)/quality control (QC) procedures followed. These methods/procedures are more fully described in the closure SAP for IRP Site 35c former diesel UST site (Parsons ES, 1997) (see Appendix A). The closure SAP was implemented by a California Registered Geologist.

3.1 SITE CLOSURE BOREHOLE LOCATIONS AND SAMPLING DEPTHS

Closure sampling was conducted on 21 March 1997. Six boreholes (CB1 through CB6) were drilled and sampled. Borehole locations are shown on Figure 3.1. Soil samples were collected at approximately 3- to 5-foot intervals beginning at 5.5 feet bgs and continuing to 13.5 feet bgs, just above the water table which was measured at 13.75 feet bgs in well BH20. Closure borehole CB2 was located through the former tank bed. Unlike all other site boreholes where dense decomposed granite was encountered at approximately 2 feet bgs, loose silty sand to at least 9 feet bgs was encountered in CB2. Pieces of black plastic were also observed in the soil cuttings. Blow counts for samples collected from 4.5 to 6 feet bgs and from 7.5 to 9 feet bgs in CB2 were 2/2/2 and 1/2/3 for 18 inches of sample, respectively. At most other depths in the other boreholes, sampler refusal was encountered 9 to 12 inches into the dense decomposed granite.

Field evidence of contamination (i.e., soil with above-background photoionization detector (PID) readings, petroleum odor, or discoloration) was detected in CB2 at 7.5-9 feet bgs and 12.5-13 feet bgs, in CB1 at 10-10.5 feet bgs and 13-13.5 feet bgs, and in CB3 at 8.5-9 feet bgs and 13-13.5 feet bgs. These samples had very slight to moderate petroleum/diesel odor and PID readings ranging from 12.4 to 110 parts per million volume per volume (ppmv). All soil samples with field evidence of contamination were submitted for laboratory analysis. In boreholes with no field evidence of contamination, two samples were retained for analysis. A total of 15 soil samples were analyzed.

3.2 DRILLING, SAMPLING, AND EQUIPMENT DECONTAMINATION

Boreholes were advanced using a drill rig equipped with 6-inch outside-diameter (OD) hollow-stem augers. Soil cuttings generated during drilling were placed in U.S. Department of Transportation (DOT)-approved, 55-gallon drums. The drums were

CONCRETE SLAB
AND ABOVE GROUND
DIESEL TANK

BUILDING 3406

BLOWER
SHED

APPROX. LOCATION
OF FORMER UST

A'

CB6

CB3

CB2

BH19

CB1

20'

BH20

MPA

VW

MPB

MPC

CB4

CB5



0 2.5' 5'
SCALE: 1" = 5'

LEGEND

- ▲ VENT WELL (VW) LOCATION
- MONITORING POINT (MP) LOCATION
- TETRA TECH MONITORING WELL LOCATION
- CLOSURE BOREHOLE (CB) LOCATION
- A-A' CROSS SECTION LOCATION

FIGURE 3.1

IRP SITE 35C AS-BUILT
SITE CLOSURE BOREHOLE LOCATIONS
MARCH ARB, CALIFORNIA

PARSONS ENGINEERING SCIENCE, INC.

labeled with the site name, drilling date, borehole number, and depth intervals. Drums were left on site within the locked perimeter fence.

Boreholes were logged by a Parsons ES geologist registered in the state of California. Soil types were classified according to the Unified Soil Classification System (USCS) and described in accordance with the standard Parsons ES soil description format. These geologic borehole logs can be reviewed in Appendix B of this report.

Before use and between boreholes, augers and other downhole equipment were cleaned to avoid cross-contamination. Cleaning was accomplished using a high-pressure hot-water wash, followed by a potable water rinse. Decontamination fluids were collected and contained in a labeled 55-gallon drum. These drums were also left on site.

Relatively undisturbed soil samples, suitable for chemical analysis, were collected at approximately 3- to 5-foot intervals. Soil samples were collected in a 2.5-inch inside-diameter (ID) split-barrel sampler that was lowered through the hollow stem of the augers and driven a maximum of 1.5 feet into undisturbed soil, ahead of the augers. The dense decomposed granite prohibited collection of the full 1.5 feet in most cases. Between sampling events, the split-barrel sampler was cleaned with Alconox[®] detergent, followed by successive potable and distilled water rinses.

The split-barrel sampler was fitted with three precleaned, 2.5-inch OD by 6-inch-long, thin-walled, brass sleeves. Before samples were collected, sample sleeves were cleaned using the same procedure as that described for the sampler. After collection of a sample, the sampler was retrieved, split apart, and the sleeves were removed. The ends of the lowest sleeves that contain the samples for chemical analyses were covered with Teflon[®] sheets and plastic end caps.

Samples in the upper sleeves were used for logging purposes, and were screened in the field for organic vapors using a PID. The data obtained from the logging and screening were recorded on borehole logs.

The sleeves for chemical analysis were labeled with the site name and borehole number, sample depth interval, date of collection, and other pertinent data. These sleeves were immediately sealed in plastic bags and placed in an insulated shipping container with ice. The samples were maintained in a chilled condition until delivered to Intertek Testing Services (formerly Inchcape Testing Services), a state of California-certified laboratory in Richardson, Texas. Chain-of-custody records were prepared in the field and accompanied the samples to the analytical laboratory.

After sampling, boreholes were backfilled with bentonite chips (hole plug) to approximately 1 foot bgs. The bentonite was hydrated during placement at a rate of 2 to 5 gallons of water per 50-pound bag of chips. A concrete cap approximately 1 foot thick was placed on top of the bentonite.

Because MPC was installed outside the zone of contamination and would serve no useful purpose should additional bioventing be required, it along with the background MP was abandoned after site closure sampling was completed. Abandonment consisted of

drilling out the MPs with the hollow-stem auger drill rig. The holes were backfilled with bentonite chips and concrete as previously described. The VW, MPA, and MPB were left undisturbed, and the blower system was restarted after the above-described site activities were completed. Should site closure be granted, March ARB should make arrangements for the VW, MPs, and monitoring wells to be properly abandoned (abandonment is not currently included in Parsons ES' scope of work).

3.3 FIELD AND LABORATORY DATA QUALITY ASSURANCE/QUALITY CONTROL

QA/QC samples for this project included an equipment rinseate blank and a trip blank. The laboratory also performed matrix spike/matrix spike duplicate (MS/MSD) analyses.

3.4 SOIL SAMPLE ANALYSIS

All samples were analyzed by Intertek, a California state-certified and AFCEE-approved laboratory. All soil samples were analyzed by EPA Method SW8020 for BTEX and methyl tertiary butyl ether (MTBE) and by EPA Method SW8015 modified for TEPH as diesel fuel.

3.5 DATA VALIDATION

Laboratory data were subjected to the data validation process described below. Based on this process, data used to support a closure recommendation are considered valid.

3.5.1 Chain-of-Custody Check

The chain-of-custody documents were reviewed for completeness and accuracy. These documents did not show any breaks in custody. All required signatures, affiliations, times, and dates were present and legible. Dates and sample numbers were consistent with project analytical reports.

3.5.2 Holding Time Check

The sample holding time is the method-specified time allowable from sample collection to sample preparation, extraction, or analysis. All sample analyses should be conducted within the holding time specific to each analytical method. Holding times for all samples were determined from documented laboratory preparation/analysis dates and compared with the sampling dates on the chain-of-custody forms. All of the results on the laboratory summary forms were checked to ensure that the reported analyses were conducted within the specified holding times. No holding times were exceeded for any of the closure samples.

3.5.3 Analytical Report Review

Laboratory reports were provided for environmental samples, the trip blank, the equipment rinseate, laboratory control samples and laboratory control sample duplicates. The reports were checked for the following information:

1. Name of laboratory and address.
2. Name of client.
3. Analytical method used (title and method number).
4. Sample identification (client and laboratory numbers).
5. Dates samples were received, extracted/digested, analyzed, and reported.
6. Sample matrix.
7. Parameters tested.
8. Agreement with chain-of-custody.
9. Reporting units.
10. Concentration of each parameter found.
11. Reporting limit for each parameter in each method.
12. Dilution factor.
13. Signature of laboratory supervisor or director.

The analytical report narrative specified any modifications to the analytical methods performed as well as any unusual situations or problems encountered during analysis or shipment (e.g., exceeded holding times, breakdown in procedures, interference, contaminants). It also included a summary of any corrective actions. The report included an explanation of terminology, acronyms, and special notations used in the report. The analytical reports were complete.

A few unusual circumstances were noted in the analytical report narrative. For the EPA SW8020 analysis, three samples (CB1/13-13.5', CB3/8.5-9', and CB3/13-13.5') reported recoveries for the surrogate bromofluorobenzene outside of QC limits due to matrix interference from high levels of non-target hydrocarbons. Five samples analyzed by EPA SW8020 (CB1/5-5.5', CB1/10-10.5', CB2/5.5-6', CB2/ 8.5-9', and CB5/13-13.5') reported areas for the internal standard fluorobenzene outside of QC limits due to matrix interference and poor purging efficiency. Therefore, the samples were reanalyzed, with similar results, confirming matrix interference. For the MS/MSD analyses of one soil sample (CB2/8.5-9'), the recoveries for TEPH were outside of the QC limits of 30-150% because the concentration of this analyte in the unspiked sample was much greater than the spiking level of 83.3 mg/kg. Since the blank spike/blank spike duplicate analyses were within QC limits, the results were accepted. Due to limited sample availability, the aqueous matrix spike analyses were conducted using reagent water. Therefore, these analyses were reported as blank spike/blank spike duplicate analyses.

3.5.4 Review of Quality Control Samples

The analysis of blank sample results is to determine the existence and magnitude of contamination problems during sampling, handling, and analysis. No contaminants should be present in the blanks. If contamination exists in any blank sample, the data associated with the blank must be carefully evaluated to determine whether or not inherent variability of the data exists, or if the problem is an isolated occurrence not affecting other data. All of the results on the laboratory summary forms were reviewed to ensure that reported results met required QC criteria.

3.5.4.1 Trip Blanks

Trip blanks are indicators of possible sample exposure to contamination during shipping. A trip blank was prepared using reagent-grade water and accompanied soil samples for volatile organic analysis in the shipping container from the sampling location to the laboratory. Contamination was not detected in the trip blank associated with the sampling event.

3.5.4.2 Rinseate Blanks

Rinseate blanks are prepared by collecting distilled water that is poured through a decontaminated split-barrel sampler. This serves as an equipment decontamination check. Contamination was not detected in the rinseate blank associated with the sampling event.

3.5.5 Matrix Spike/Matrix Spike Duplicate Analysis

The MS/MSD data are generated to determine long-term precision and accuracy of the analytical method with respect to the various matrices subject to analysis. The percent recovery of a spike was calculated by the laboratory and compared with an acceptable range specific to each method. The precision of each method was assessed by calculating the relative percent difference (RPD) from the MS/MSD analysis and comparing the value with an acceptable range established for each method. All of the results on the laboratory data summary forms were reviewed to ensure that reported results met required QC criteria. The laboratory reported that all surrogate spike criteria and RPD data met QC criteria.

SECTION 4

CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the analytical results from the closure sampling activities. Based on earlier site investigations, bioventing pilot testing, and the results of the closure sampling event, conclusions regarding remediation of fuel contamination are summarized, and recommendations are presented.

4.1 CLOSURE SAMPLE LABORATORY RESULTS

Complete laboratory analytical results from Intertek are presented in Appendix C. Analytical results are summarized in Table 4.1 and shown on Figure 4.1. Laboratory test results for MTBE were non-detect in all boreholes. Laboratory test results for BTEX were non-detect in all boreholes except for CB1 where o-xylene was detected at 244 µg/kg in the 13-13.5 foot sample. TEPH were detected in all boreholes except CB5. Detectable TEPH concentrations ranged from 13.3 to 3,560 mg/kg.

4.2 MIGRATION EVALUATION

4.2.1 BTEX Compounds

The RWQCB recommends "soil cleanup goals be based on leaching analysis such that the contamination to remain in place does not pose a significant risk to the underlying groundwater" (RWQCB, 1996a). The "low-risk" thresholds for groundwater that have been developed for BTEX are listed in Table 4.2. Soil with BTEX concentrations above detection limits was restricted to an area immediately adjacent to the former UST. A simple, linear equilibrium partitioning relationship was used to determine whether the measured soil concentrations may result in leachate generation that could cause underlying groundwater to exceed the established "low risk" thresholds. This method for evaluating the potential for soil contaminants to leach into underlying groundwater was developed by the American Society for Testing and Materials (ASTM, 1995).

The equilibrium relationship is based on a simple conceptual model that describes how residual contamination with a soil matrix partitions between sorbed, dissolved, and vapor phases given constant chemical- and soil-specific parameters. This relationship is conservative because it assumes steady-state leaching from a constant, non-diminishing source. Table 4.3 presents the residual BTEX concentrations that can persist in site soils and not pose a risk to underlying groundwater quality (i.e., cause concentrations in excess of the "low risk" thresholds). No measurable BTEX concentration (Table 4.1) exceeds

Table 4.1
Laboratory Analytical Results
21 March 1997
IRP Site 35c, Former Diesel UST
March ARB, California

Sample Location	Depth (feet bgs) ^{b/}	TEPH ^{c/}	Volatile Aromatics ^{a/}					
			Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	MTBE ^{d/}
	Units =>	mg/kg ^{e/}	µg/kg ^{f/}	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
CB1	5.0 - 5.5	<10.6	<1.1	<2.1	<2.1	<2.1	<2.1	<2.1
	10.0 - 10.5	2,920	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0
	13.0 - 13.5	1,880	<5.2	<10.3	<10.3	<10.3	244	<10.3
CB2	5.5 - 6.0	2,510	<1.1	<2.2	<2.2	<2.2	<2.2	<2.2
	8.5 - 9.0	3,560	<1.1	<2.3	<2.3	<2.3	<2.3	<2.3
	12.5 - 13.0	2,190	<1.0	<2.1	<2.1	<2.1	<2.1	<2.1
CB3	6.5 - 7.0	<10.7	<1.1	<2.2	<2.2	<2.2	<2.2	<2.2
	8.5 - 9.0	1,570	<5.3	<10.5	<10.5	<10.5	<10.5	<10.5
	13.0 - 13.5	2,270	<5.2	<10.4	<10.4	<10.4	<10.4	<10.4
CB4	8.5 - 9.0	312	<1.0	<2.1	<2.1	<2.1	<2.1	<2.1
	13.0 - 13.5	<10.4	<1.1	<2.1	<2.1	<2.1	<2.1	<2.1
CB5	8.5 - 9.0	<10.3	<1.0	<2.1	<2.1	<2.1	<2.1	<2.1
	13.0 - 13.5	<10.4	<1.0	<2.1	<2.1	<2.1	<2.1	<2.1
CB6	5.5 - 6.0	13.3	<1.1	<2.1	<2.1	<2.1	<2.1	<2.1
	8.5 - 9.0	<10.3	<1.0	<2.1	<2.1	<2.1	<2.1	<2.1
Units =>		mg/L ^{g/}	µg/L ^{h/}	µg/L	µg/L	µg/L	µg/L	µg/L
Trip blank		NA ^{i/}	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Rinseate blank		<1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

^{a/} Analyzed using USEPA Method SW8020.

^{b/} bgs = below ground surface.

^{c/} TEPH = total extractable petroleum hydrocarbons analyzed using USEPA Method SW8015 modified for diesel-range organics.

^{d/} MTBE = methyl tertiary butyl ether.

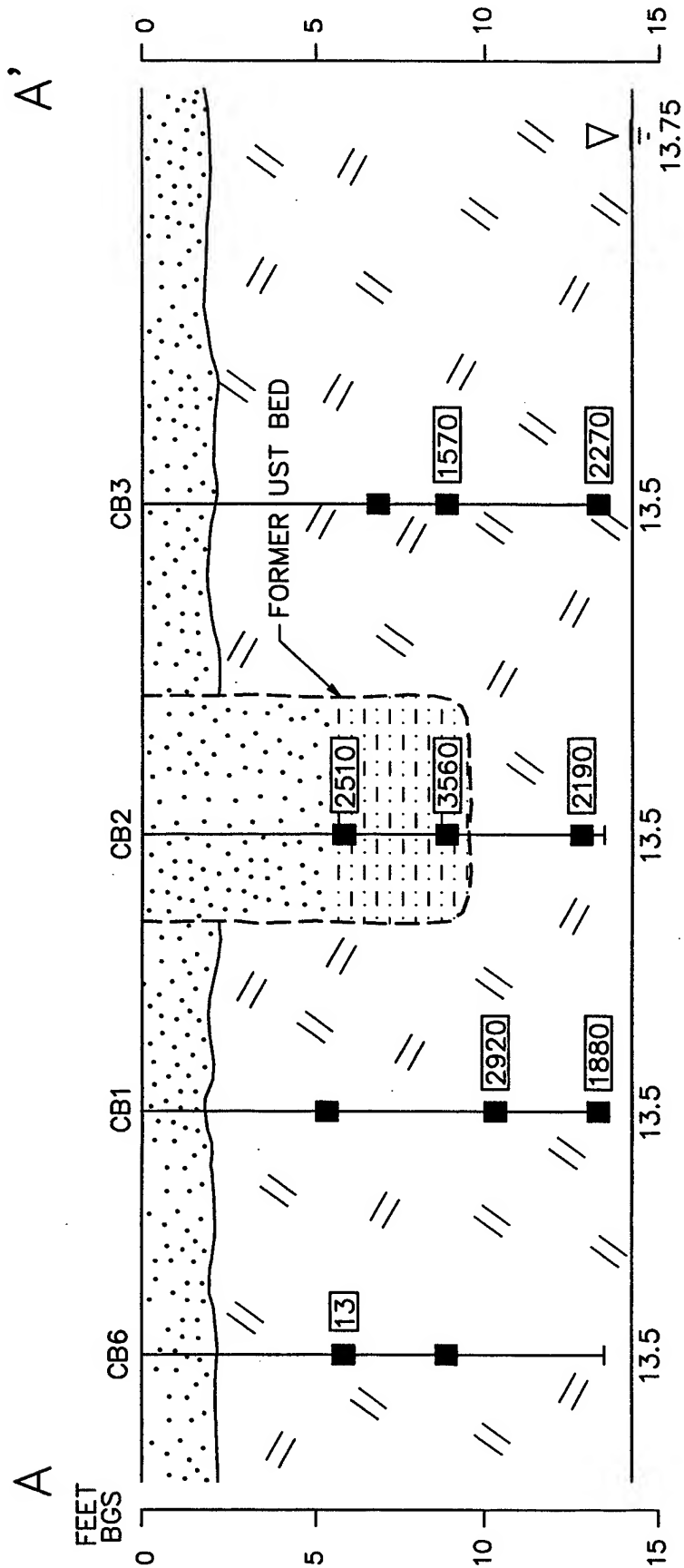
^{e/} mg/kg = milligrams per kilogram.

^{f/} µg/kg = micrograms per kilogram.

^{g/} mg/L = milligrams per liter.

^{h/} µg/L = micrograms per liter.

^{i/} NA = not analyzed.



LEGEND

- SAND
- SILTY SAND
- DECOMPOSED GRANITE
- WATER TABLE
- CB3 BOREHOLE LOCATION
- SOIL SAMPLE LOCATION WITH ABOVE DETECTION LIMITS LABORATORY RESULTS FOR TEPH IN mg/kg
- 13.5 TOTAL DEPTH

FIGURE 4.1

IRP SITE 35C
GEOLOGICAL CROSS SECTION
MARCH ARB, CALIFORNIA

PARSONS ENGINEERING SCIENCE, INC.

Table 4.2
"Low-Risk" Thresholds for Groundwater

Constituent	Maximum Contaminant Limit (ppb)	"Low-Risk" Threshold (ppb)
Benzene	1	250
Toluene	150	300
Ethylbenzene	680	680
Xylene	1750	1750

these groundwater-protective levels. Consequently, the leaching analysis demonstrates that no further remediation of site soils is necessary to protect groundwater quality.

4.2.2 TEPH Data

Monitoring wells BH19 and BH20 located 4.5 feet north and 14 feet southeast of the former UST, respectively, were non-detect for diesel-range hydrocarbons when last sampled in 1992. Hydrocarbons in the motor oil range at a concentration of 1.02 mg/L was detected in BH19. However, groundwater at the site during 1992 was approximately 18 feet bgs. A year-long quarterly groundwater monitoring program conducted from 1992 to 1993, during which time the water table increased to 5.3 feet bgs, detected no BTEX using EPA Method 8260. Analysis for TEPH was not performed.

The RWQCB has not established "low-risk" thresholds for TEPH in groundwater. However, there are no known drinking water wells within at least one mile (March ARB, 1996). Though site groundwater is considered of potential beneficial use by the RWQCB, aquifer thickness is approximately 15 to 20 feet thick (RWQCB, 1996b). Below the weathered granite aquifer is non-water-bearing unweathered granite. Approximately 1.5 miles east of the site, the water-bearing weathered granite may recharge the alluvium deposits of Perris Valley beneath the Main Base. Perris Valley groundwater generally flows to the southeast. South and east of the Main Base are agricultural wells which produce from Perris Valley alluvium. All water for domestic consumption is provided by the Eastern Municipal Water District. Even if site groundwater were to become impacted by remaining site TEPH contamination, it would most likely not migrate more than a few hundred feet, and not the 1.5 miles needed to impact an aquifer utilized for agriculture irrigation. However, the potential for TEPH to adversely impact underlying groundwater quality is low.

4.3 CONCLUSIONS

Year-end bioventing pilot test sampling indicated a significant amount of BTEX and TRPH contamination had been bioremediated during the first year of system operation. Soil gas ethylbenzene and xylene concentrations were reduced by 92.5 to 98.4

Table 4.3
Leaching Evaluation for BTEX Compounds
IRP Site 35c, Former Diesel UST
March ARB, California

Input Parameters

Description	Value	Source
Soil bulk density (ρ_s)	1.7 g-soil/cm ³ -soil	Residential default (ASTM, 1995)
Volumetric water content in soils (θ_{ws})	0.12 cm ³ -H ₂ O/cm ³ -soil	Residential default (ASTM, 1995)
Soil-water sorption coefficient (k_s)	* cm ³ -H ₂ O/g-soil	See below
Henry's Law Constant (H)	* unitless	See below
Volumetric air content (θ_{as})	0.26 cm ³ -air/cm ³ -soil	Residential default (ASTM, 1995)
Groundwater velocity (U)	2500 cm/yr	Residential default (ASTM, 1995)
Groundwater mixing thickness (x)	200 cm	Residential default (ASTM, 1995)
Infiltration rate through soils (I)	30 cm/yr	Residential default (ASTM, 1995)
Width of source area (W)	1500 cm	Residential default (ASTM, 1995)

* chemical specific

Partitioning Equation - ASTM, 1995

$$\text{Soil threshold (mg/kg)} = [(\text{"low risk" threshold, mg/L}) * (\theta_{ws} + k_s \rho_s + H \theta_{as}) * (1 + Ux/IW)] / \rho_s$$

Compound	H	k_s	Low-risk (mg/L)	Soil Leaching (mg/kg)
Benzene	0.232	0.190	0.25	0.9
Toluene	0.265	0.674	0.3	2.8
Ethylbenzene	0.265	0.477	0.68	4.8
Xylenes	0.289	1.199	1.75	27.7

percent. Soil gas total volatile hydrocarbon concentrations were reduced by 70 to 99.5 percent. Soil ethylbenzene and xylene concentrations were reduced to non-detect. Year-end TRPH were reduced to non-detect in two out of three soil samples. Unfortunately, all the bioventing samples were located northeast and southwest of the former UST bed. It was not until CB2 was drilled that the former UST bed and the source of site contamination was identified.

Analysis for MTBE was added at the request of the RWQCB. MTBE was not detected at the site.

The only BTEX component detected during closure sampling was o-xylene in CB1 (13-13.5'). Remaining site xylene contamination is limited to an area south of the former UST. Xylene contamination in soil is below what could impact site groundwater to the extent of exceeding "low-risk" thresholds. Past site monitoring activities have never detected BTEX in the groundwater.

Remaining site TEPH contamination is limited to an area adjacent to the former UST. TEPH has not previously been detected in site groundwater. If remaining TEPH contamination were to impact site groundwater, the resulting plume would naturally attenuate within a few hundred feet, well before any human or environmental receptor could be impacted.

4.4 RECOMMENDATIONS

Given the previous site information and the closure sample analytical results summarized above, it is requested that the RWQCB approve closure for IRP Site 35c.

SECTION 5

REFERENCES

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APPENDIX A

FINAL CLOSURE SAMPLING AND ANALYSIS PLAN

FINAL

Closure Sampling and Analysis Plan IRP Site 35c Former Diesel UST Site



**March Air Reserve Base
California**

Prepared For

**Air Force Center for Environmental Excellence
Technology Transfer Division
Brooks Air Force Base
San Antonio, Texas**

and

**March Air Reserve Base
California**

January 1997



**PARSONS
ENGINEERING SCIENCE, INC.**

9404 Genesee Ave., Suite 140 • La Jolla, California 92037

FINAL

CLOSURE SAMPLING AND ANALYSIS PLAN
FOR
IRP SITE 35c FORMER DIESEL UST SITE
MARCH ARB, CALIFORNIA

Prepared for

Air Force Center for Environmental Excellence
Brooks Air Force Base, Texas

and

March Air Reserve Base, California

January 1997

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SECTION 1

INTRODUCTION

During the past two years, March Air Reserve Base (ARB), {formerly March Air Force Base (AFB)} has participated in the Air Force Bioventing Pilot Test Initiative Project. Sponsored by the Air Force Center for Environmental Excellence (AFCEE) at Brooks AFB, Texas, the project included conducting more than 135 *in situ* bioventing pilot tests at 48 Air Force installations throughout the country. These tests were designed to collect data on the effectiveness of bioventing for the remediation of soil contaminated with fuel hydrocarbons (i.e., JP-4 jet fuel, diesel fuel, gasoline, heating oil, etc.). A one-year-long bioventing pilot test has recently been concluded at the Installation Restoration Program (IRP) Site 35c Former Diesel Underground Storage Tank (UST) Site at March ARB site. Based on the results of the one-year test, *in situ* bioventing has been effective enough to support closure of Site 35c.

This Site Closure Sampling and Analysis Plan (SAP) has been prepared by Parsons Engineering Science, Inc. (Parsons ES) for submittal to March ARB, AFCEE, and the California Regional Water Quality Control Board Santa Ana Region (RWQCB). This SAP presents a plan for confirmation soil sampling and analysis to document the effectiveness of soil remediation at this site and to demonstrate compliance with regulatory requirements for closure. It is anticipated that analytical results of soil samples collected during the implementation of the SAP described herein will support a no-further-action recommendation, and that the RWQCB will grant site closure.

This SAP consists of six sections, including this introduction. Section 2 includes site descriptions, histories, and summaries of previous investigations and remediation activities. Section 3 summarizes all applicable site closure requirements. A detailed site closure SAP is presented in Section 4. Analytical results will be presented in a site closure report as described in Section 5. Section 6 provides references cited in this SAP.

SECTION 2

SITE DESCRIPTION AND HISTORY

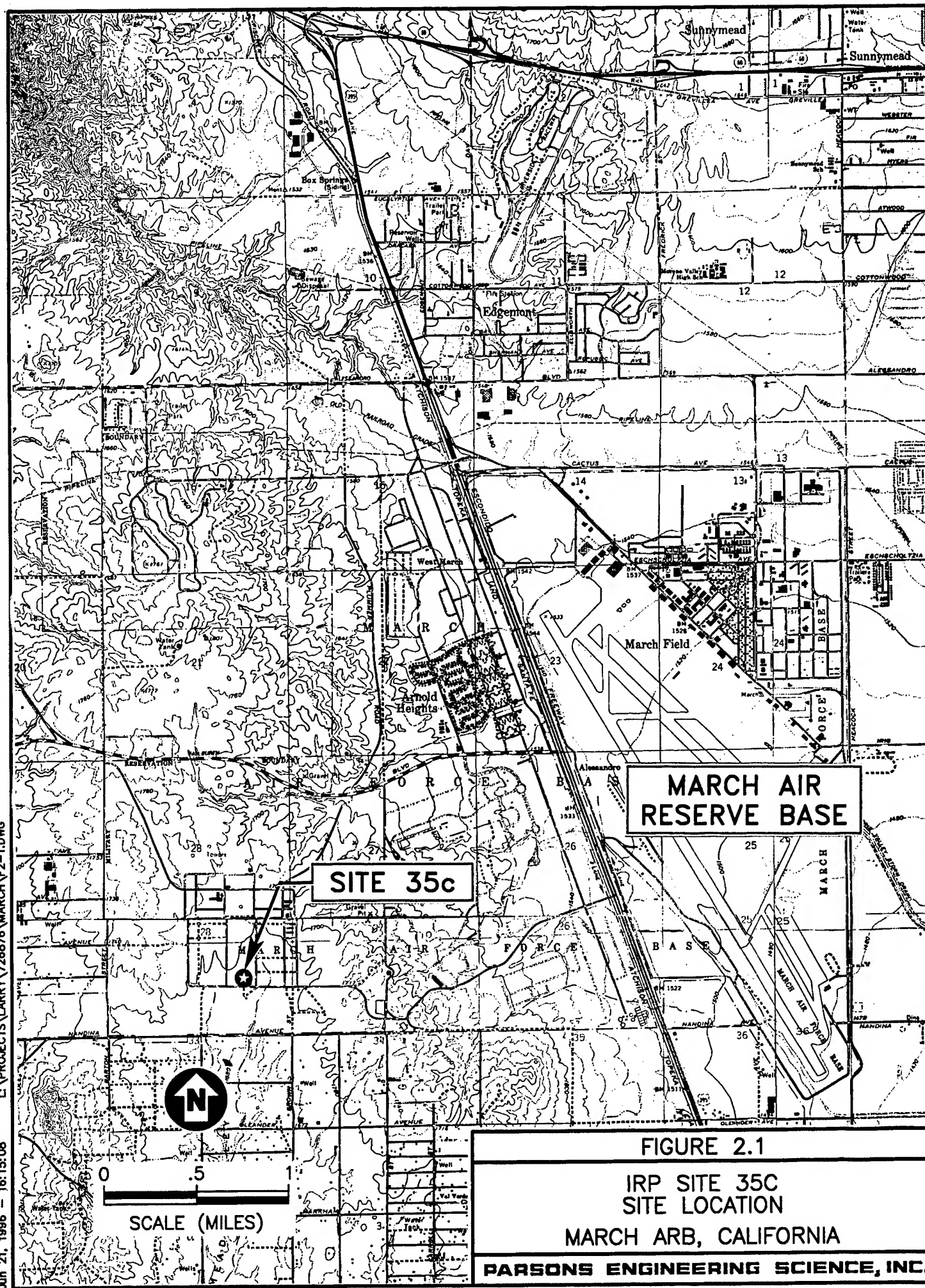
March ARB is located on approximately 7,000 acres in the northern end of Perris Valley in Riverside County, California. The base is located about 60 miles east of Los Angeles and 90 miles north of San Diego, California. March ARB is bisected in a northwest-southeast direction by Interstate Highway 215 (I-215) (Figure 2.1). East of I-215 is the Main Base where the air field and the majority of base facilities are located. This portion of the base lies on the relatively flat alluvium of Perris Valley. West of I-215 lies West March. This area is typified by gently undulating topography. Massive granite outcrops are common. The area is mostly undeveloped. Installation Restoration Program (IRP) Site 35c is located in West March.

March ARB opened on 1 March 1918 as the Alessandro Aviation Field. The base was a pilot training center during World War I. By 1938, March ARB was an Army bombing and gunnery training center. Camp Haan Army Base was constructed on what is now West March. As many as 80,000 personnel were stationed at Camp Haan at one time during World War II. After World War II, Camp Haan became March AFB and has served as a Strategic Air Command (SAC) bomber and air-to-air refueling operations base. The Headquarters 15th Air Force, located at March AFB, supervised SAC's western operations. The primary mission of the host unit, the 22nd Air Refueling Wing, was to maintain an effective air-to-air refueling capability. In September 1993, March AFB was designated by Congress as a realignment base. By 31 March 1996, all active duty personnel and aircraft were to be transferred (Tetra Tech, April 1995). March AFB was re-designated as March ARB and now supports Air Force Reserve activities.

The land uses adjacent to the base are a mixture of agricultural, residential, and commercial. Recently, significant residential development has occurred in the city of Moreno Valley, north and east of the base.

2.1 SITE DESCRIPTION

IRP Site 35c consists of a former 1,000-gallon diesel UST location east of Building 3406 (Figure 2.2). The building houses an emergency generator for the transmitter facility located at the nearby Building 3405. The generator is now supplied by an above ground storage tank located immediately north of building 3406. The entire compound is enclosed by a 7-foot-tall fence. The facility is located at the southern end of Dalla Avenue.



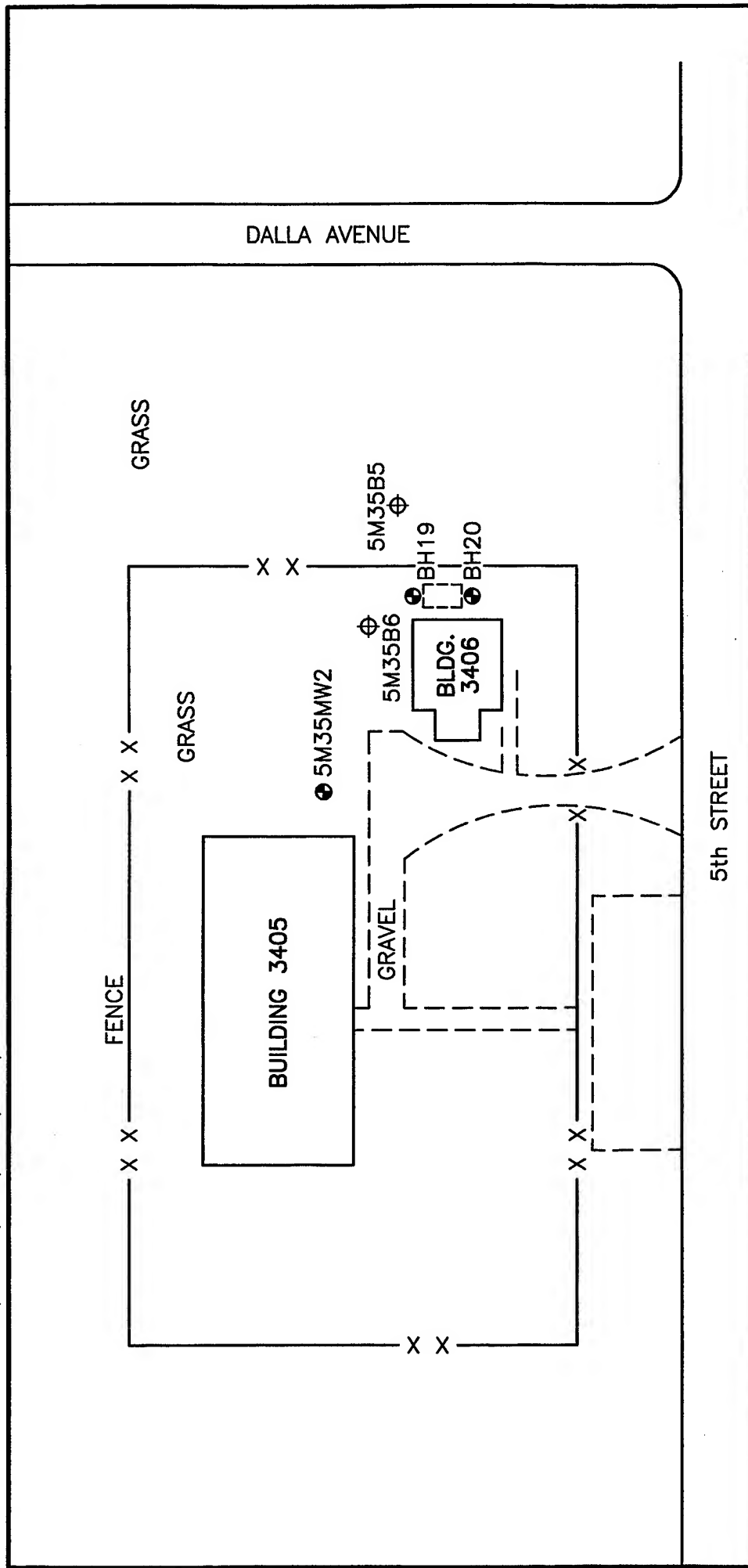
**MARCH AIR
RESERVE BASE**

SITE 35c

FIGURE 2.1

**IRP SITE 35C
SITE LOCATION
MARCH ARB, CALIFORNIA**

PARSONS ENGINEERING SCIENCE, INC.



0 25' 50'
SCALE: 1" = 50'



LEGEND

- ⊕ TETRA TECH SOIL BOREHOLE LOCATION
- TETRA TECH MONITORING WELL LOCATION
- FORMER 1,000-GAL. DIESEL TANK

FIGURE 2.2

IRP SITE 35C
SITE LAYOUT

MARCH ARB, CALIFORNIA

PARSONS ENGINEERING SCIENCE, INC.

The former 1,000-gallon diesel UST was used to store fuel for an emergency generator located in Building 3406. Site information provided by March ARB was limited. The information did not include: (1) tank removal date; (2) the location, depth and extent of the tank excavation; (3) the description of the backfill material; (4) the number, location and analytical results of soil samples collected during tank removal (if any); or (4) the extent of contamination left in place.

2.2 SITE GEOLOGY AND HYDROGEOLOGY

Site 35c lies on the Perris Surface. This area is typified by Cretaceous and older crystalline rock outcrops with shallow soil cover. The granite rock of West March is often highly weathered at the contact with the soil cover. The thickness of the weathered zone is not known. Groundwater is often present in this weathered zone.

Subsurface conditions encountered during bioventing system installation (Parsons ES, 1994) included coarse sand from ground surface to about 2 feet below ground surface (bgs). Weathered granite was encountered at 2 feet bgs in all Site 35c bioventing-related boreholes.

Three groundwater wells, 5M35MW2, BH19, and BH20 have been installed at the site. Depth to groundwater in 5M35MW2 was monitored from January 1993 to March 1994. The depth ranged from 5.30 feet bgs on 4 March 1993 to 13.97 feet bgs on 18 January 1993. In March 1994, during bioventing system installation, groundwater was encountered at 13 feet bgs in the borehole for the vent well. Groundwater was encountered at 10 feet bgs during year-end bioventing testing in June 1995.

Because of the limited number of wells and their placement, accurate groundwater flow direction and gradient measurements have not been made. The groundwater flow direction is believed to be to the south, generally following the surface topographic slope (Tetra Tech, April 1995).

2.3 PREVIOUS INVESTIGATIONS

2.3.1 UST Survey 1988

In 1988, Lee Wan & Associates, Inc. conducted a UST survey at Site 35c. The survey included records searches, interviews with site personnel, visual site inspection, metal detector surveys, and field sampling of tank contents and surrounding soil. The survey indicated the UST at Site 35c had leaked (Tetra Tech, April 1995). Site analytical results are not known as the Lee Wan & Associates Report is no longer available from March ARB.

2.3.2 Site Investigation 1992

In 1992, Tetra Tech conducted a site investigation consisting of a geophysical survey, a soil gas survey, soil sampling and groundwater sampling. The limited geophysical survey was performed to locate any previously undetected UST or the former

UST tank bed. The geophysical survey tentatively identified a backfilled tank pit near the northeast corner of Building 3406.

As part of an expanded source investigation, Tetra Tech conducted a soil gas survey at the site in 1992. Twenty-three points were sampled for organic compounds at depths between 2.5 and 4 feet bgs. Soil gas sample point locations are shown on Figure 2.3. No organic compounds were detected in point 137 located closest to the former tank bed. Toluene and xylenes were detected in several soil gas samples (Figure 2.3). The mean soil gas concentrations for toluene and xylenes were $1.24\text{E-}08$ and $1.15\text{E-}09$ g/cm³ respectively. These soil gas contaminants were evaluated by comparing the dissolved concentration, at equilibrium with the measured soil gas concentration, with the 1994 U.S. Environmental Protection Agency (EPA) Region IX Preliminary Remediation Goals (PRGs) for tap water. Toluene and xylene equilibrium concentrations were below their respective PRGs and posed no risk to site groundwater (Tetra Tech, April 1995).

Soil samples were also collected as part of the 1992 investigation. Soil samples were collected at 5-foot intervals from 5 to 30 feet bgs in BH19 and from 5 to 40 feet bgs in BH20. Samples were analyzed by EPA Method SW8015 modified for gasoline, diesel, and motor oil. Analysis for diesel indicated concentrations of 696 mg/kg and 5,320 mg/kg in samples from BH19, at 5 and 10 feet bgs, respectively. All other samples were non-detect.

Monitoring wells BH19 and BH20 were installed during the 1992 investigation. The wells are located immediately north and south of the former tank bed, according to 1995 Remedial Investigation report figures (Tetra Tech, April 1995). Depth to groundwater at the time of installation was 18.86 feet bgs in BH19 and 18.33 feet bgs in BH20. However, 1992 was near the end of a seven-year drought in southern California. Monitoring well 5M35MW2 was installed in early 1993. The water level increased after the heavy rains during the winter of 1992/1993 to 5.3 feet bgs and has been dropping slightly. Depth to site groundwater was 12.53 feet bgs during the last monitoring event on 29 March 1994.

Monitoring wells BH19 and BH20 were sampled in 1992. Samples were analyzed by EPA Method SW8015. Results indicated a concentration of 1.02 mg/L of petroleum hydrocarbons in the motor oil range in BH19 only. Beginning in the winter of 1992/1993, BH19 and BH20 were sampled quarterly for one year. This included the period of highest site groundwater (5.3 feet bgs) as measured in 5M35MW2. Samples were analyzed by EPA Method SW8260. All results were non-detect.

Beginning in the summer of 1993, well 5M35MW2 was sampled quarterly for one year. Groundwater samples were analyzed for volatile hydrocarbons by EPA Method SW8260. A chloromethane concentration of 5.0 µg/L was detected in the summer 1993 sample. Data validation classified this as an estimated result. All other results were non-detect.

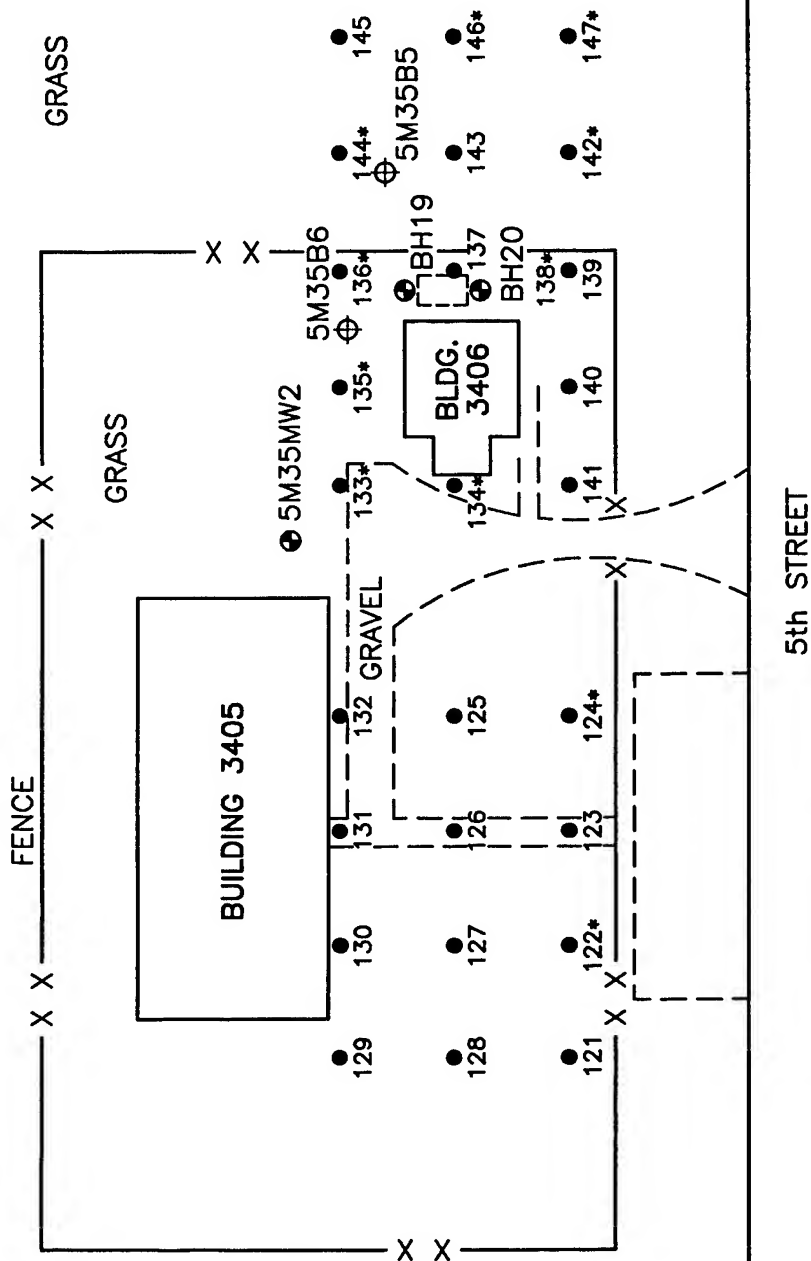


FIGURE 2.3

IRP SITE 35C
SOIL GAS SAMPLING POINT LOCATIONS
MARCH ARB, CALIFORNIA
PARSONS ENGINEERING SCIENCE, INC.

LEGEND

- ⊕ TETRA TECH SOIL BOREHOLE LOCATION
- ⊙ TETRA TECH MONITORING WELL LOCATION
- [] FORMER 1,000-GAL. DIESEL TANK
- TETRA TECH SOIL GAS SAMPLING POINT
- * NOTES ELEVATED RESULTS

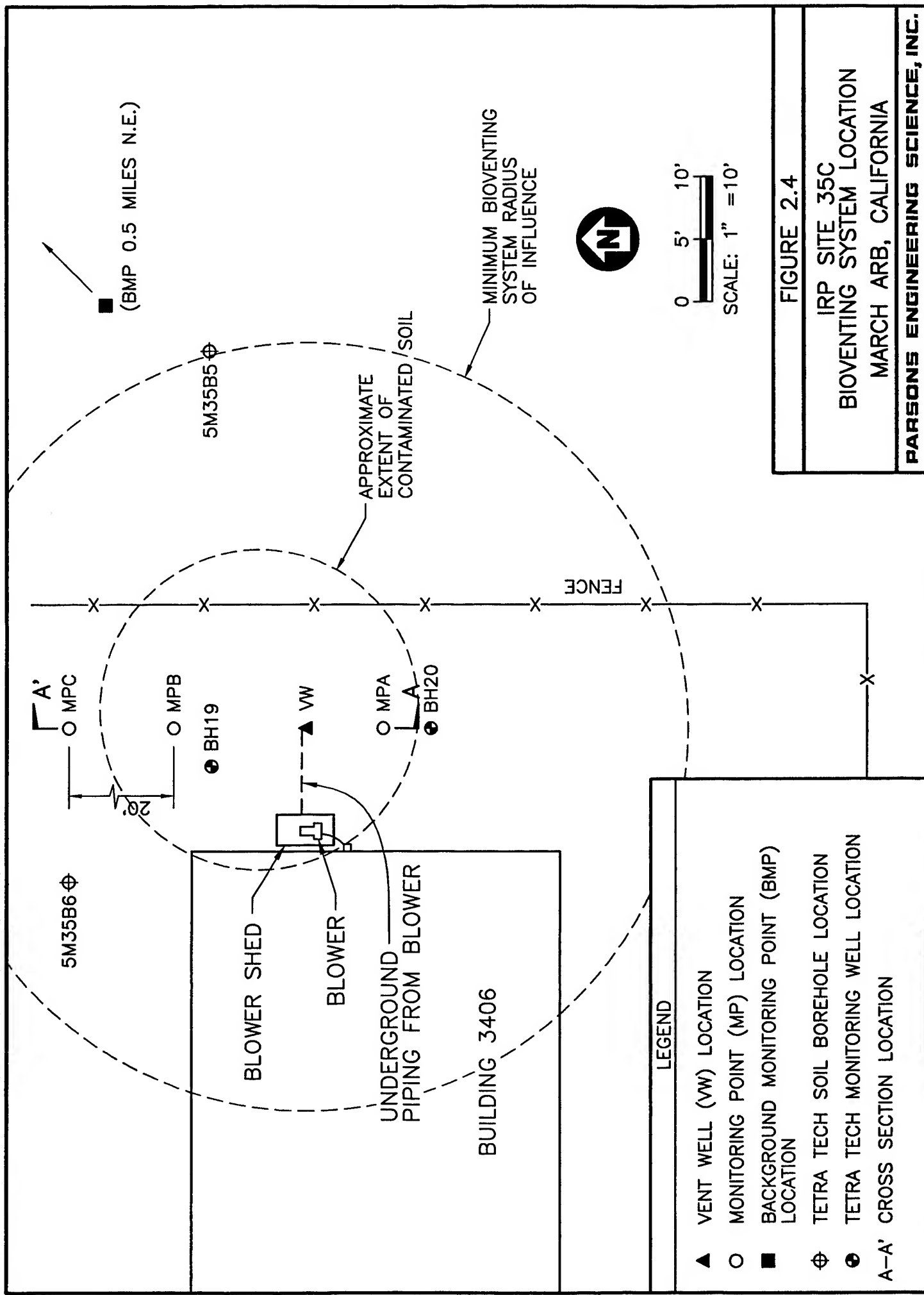
2.3.3 Bioventing: 1994-1995

Bioventing pilot testing activities were conducted by Parsons ES beginning in March 1994. As part of the pilot test, one vent well (VW) for injection of air into the subsurface and three soil gas monitoring points (MPs) were installed at the site. An additional background MP was installed approximately 0.5 miles from the site, midway between IRP Site 35c and another IRP site originally scheduled for pilot testing but canceled due to lack of contamination. VW and MP locations are shown on Figure 2.4 and in cross-section on Figure 2.5. The VW and MPA were to be located in the former tank bed, the location of which was obtained from previous site investigation documents. Because the project focus was on bioventing rather than site characterization, only limited sampling was performed. Three soil and three soil gas samples were collected from the VW and MPs. Analytical results are presented in Table 2.1. Detailed pilot testing procedures and results were presented in the bioventing results report (Parsons ES, 1994).

Initial testing indicated the extent of contamination is limited to a zone approximately 3 to 11 feet bgs and extends from the VW about 15 feet. Soil with the strongest field or laboratory evidence of contamination was located at 6 feet bgs in MPB. MPC, located 20 feet from MPB, had no field or laboratory evidence of contamination. Respiration tests indicated approximately 1,100 mg of hydrocarbons per kg of soil per year could be bioremediated. The air permeability test indicated that injecting air at a rate of about 12.5 standard cubic feet per minute (scfm) produced a zone of oxygen influence of at least 31 feet which was beyond the extent of contaminated soil.

Long-term air injection at the site continued until May 1995. Year-end sampling completed in June 1995 indicated a 70 to 99.5 percent reduction in total volatile hydrocarbons (TVH), and a 92.5 to 98.4 percent reduction in ethylbenzene and xylenes in soil gas samples. Ethylbenzene and xylene concentrations were reduced to non-detect levels in soil sample MPB-6, the only soil sample with any initial ethylbenzene and xylene contamination. Total recoverable petroleum hydrocarbon (TRPH) concentrations were reduced to non-detect levels in two of the three soil samples (Table 2.1). The 4-foot-deep sample from MPA had a TRPH concentration of 15.7 mg/kg. The year-end respiration test indicated a hydrocarbon biodegradation rate of approximately 960 mg/kg per year. The relatively constant respiration rate most likely indicates TRPH was still being degraded at the time of the year-end test. Following year-end testing, the blower was restarted and is currently injecting air into the VW. Based on the encouraging year-end sampling and testing results, it is anticipated that site TRPH concentrations are below 100 mg/kg, and the BTEX concentrations are below detection limits.

Quarterly groundwater monitoring results described in Subsection 2.3.2 and year-end bioventing test results have provided considerable information to support a no further remedial action determination and site closure. However, as previously described, site contamination originated from a former diesel UST. Although the VW and MPA were to be located through the former tank pit, none of these boreholes appeared to penetrate fill material. As shown on the cross-section, all bioventing-related boreholes penetrated first 2 feet of coarse sand, then weathered granite. The weathered granite was very dense and



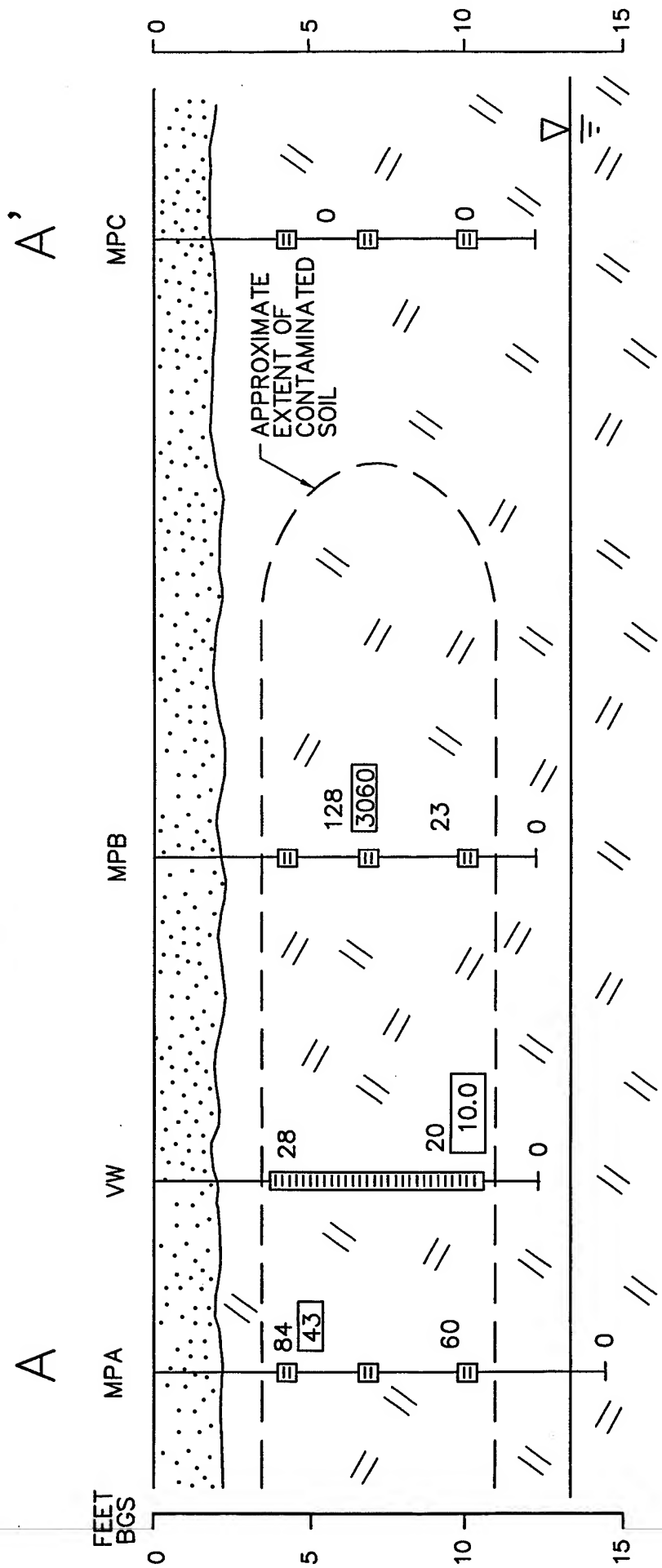
LEGEND

- ▲ VENT WELL (VW) LOCATION
- MONITORING POINT (MP) LOCATION
- BACKGROUND MONITORING POINT (BMP) LOCATION
- ⊕ TETRA TECH SOIL BOREHOLE LOCATION
- ⊙ TETRA TECH MONITORING WELL LOCATION
- A-A' CROSS SECTION LOCATION

FIGURE 2.4

IRP SITE 35C
BIOVENTING SYSTEM LOCATION
MARCH ARB, CALIFORNIA

PARSONS ENGINEERING SCIENCE, INC.



LEGEND

123	FIELD OVA READINGS (PPMV)	Monitoring Point
222	SAND	Screen Interval
211	DECOMPOSED GRANITE	Laboratory Results for Total Recoverable Petroleum Hydrocarbons by EPA 418.1 (mg/kg)
		Vent Well Screened Interval

FIGURE 2.5

IRP SITE 35C
GEOLOGICAL CROSS SECTION
MARCH ARB, CALIFORNIA

PARSONS ENGINEERING SCIENCE, INC.

Table 2.1

**Initial and 1-Year Soil and Soil Gas Analytical Results
IRP Site 35c, Former Diesel UST
March ARB, California**

Analyte (Units) ^{a/}	Sample Locations-Depth (feet below ground surface)					
	MA1-VW		MA1-MPB-7		MA1-MPC-4	
	Initial ^{b/}	1-Year ^{c/}	Initial	1-Year ^{d/}	Initial	1-Year
Soil Gas Hydrocarbons						
TVH (ppmv)	85 ^{e/}	2.8	290	87	110	0.54
Benzene (ppmv)	<0.027	<0.002	<0.06	<0.003	<0.12	<0.002
Toluene (ppmv)	<0.027	<0.002	<0.06	0.003	<0.12	<0.002
Ethylbenzene (ppmv)	0.24	<0.002	0.92	0.015	<0.12	<0.002
Xylenes (ppmv)	0.34	0.008	1.6	0.12	<0.12	0.003
Soil Hydrocarbons						
	MA1-VW-9		MA1-MPA-4		MA1-MPB-6	
	Initial ^{f/}	1-Year ^{g/}	Initial	1-Year	Initial	1-Year
TRPH (mg/kg)	10	<9.98	43	15.7	3060	<9.99
Benzene (mg/kg)	<0.0006	<0.050	<0.0006	<0.051	<0.066	<0.050
Toluene (mg/kg)	<0.0006	<0.050	<0.0006	<0.051	<0.066	<0.050
Ethylbenzene (mg/kg)	<0.0006	<0.050	<0.0006	<0.051	0.15	<0.050
Xylenes (mg/kg)	<0.0008	<0.130	<0.0008	<0.130	0.48	<0.130
Moisture (%)	3.5	3.2	3.8	2.7	4.9	3.6

^{a/} TVH=total volatile hydrocarbons: ppmv = parts per million, volume per volume;
TRPH = total recoverable petroleum hydrocarbons; mg/kg = milligrams per kilogram.

^{b/} Initial soil gas samples collected on March 18, 1994.

^{c/} Final soil gas samples collected on June 16, 1995. Blower system was shut down approximately 30 days prior to soil gas sampling to allow soil gas to come to equilibrium with soils.

^{d/} Result averaged with duplicate sample.

^{e/} Initial sample at this location incorrectly reported as 8.5 ppmv in Interim Results Report, July 1994.

^{f/} Initial soil samples collected on March 15, 1994.

^{g/} Final soil samples collected on July 3, 1995.

appeared to be native and not backfill material. Because soil with the highest contamination is most likely associated with the former tank bed, it is possible significant site soil contamination still exists. Section 4 describes the site closure activities proposed for this site. The activities will confirm whether bioventing has remediated site contamination sufficiently to support site closure.

SECTION 3

SITE CLOSURE REQUIREMENTS

Recently, the Underground Storage Tank Program of the California State Water Resources Control Board contracted with Lawrence Livermore National Laboratory (LLNL) to review the current regulatory framework and cleanup process. The results of this review were released on October 16, 1995, in the report entitled "Recommendations to Improve the Cleanup Process for California's Leaking Underground Fuel Tanks (LUFTs)". In early December a memo from the State Water Resources Control Board Executive Director, Mr. Walt Pettit, was issued which recommended implementing the recommendations of the LLNL report for "low-risk" cases (RWQCB, January 1996). The Executive Director recommended active remediation at "low-risk" groundwater sites be replaced with long-term monitoring to determine if the fuel leak is stable. The Director gave an example of a low-risk groundwater as "shallow groundwater with maximum depth to water less than 50 feet and no drinking water well screened in the shallow groundwater zone for 250 feet of the leak" (W. Pettit, December 1995).

IRP Site 35c meets the Executive Director's description of a "low-risk" groundwater site. Maximum depth to groundwater is less than 50 feet. There are no known drinking water wells within at least one mile (March ARB, 1996). Though site groundwater is considered of potential beneficial use by the RWQCB, aquifer thickness is approximately 15 to 20 feet thick (RWQCB, 1996). Below the weathered granite aquifer is non-waterbearing unweathered granite. With the exception of a TRPH (in the motor oil range) concentration of 1.02 mg/L detected during the initial sampling of BH19, four additional quarters of groundwater monitoring have detected no BTEX or other petroleum related hydrocarbons in site groundwater. This year-long monitoring of all three site wells, two located adjacent to the former tank bed, indicate site contamination has not impacted groundwater, even after the time of relatively high groundwater levels (5.30 feet bgs). The beneficial effects of long-term bioventing described in Subsection 2.3.4 has further reduced the risk by greatly reducing both BTEX and TRPH concentrations in site soils.

3.1 SITE SOIL CLEANUP STANDARDS

The RWQCB is the lead agency for March ARB at most UST sites. On 26 January 1996, the RWQCB Santa Ana Region issued a response to the Executive Director's memo. In keeping with their specific setting, the RWQCB has set their own definition of "low-risk" cases which incorporates two primary criteria. The RWQCB

considers cases "low risk" if the area: (1) does not recharge a presently utilized aquifer, and (2) does not have groundwater contamination that exceeds the following "low-risk" thresholds:

<u>CONSTITUENT</u>	<u>MCLs</u>	<u>"LOW-RISK" THRESHOLD</u>
Benzene	1 ppb	250 ppb
Toluene	150 ppb	300 ppb
Ethylbenzene	680 ppb	680 ppb
Xylene	1750 ppb	1750 ppb

The response also recommends "soil cleanup goals be based on leaching analysis such that the contamination to remain in place does not pose a significant risk to the underlying groundwater".

Site 35c may not technically meet the first criterion. Approximately 1.5 miles east of the site, the water-bearing weathered granite may recharge the alluvium deposits of Perris Valley beneath the Main Base. Perris Valley groundwater generally flows to the southeast. South and east of the Main Base are agricultural wells which produce from Perris Valley alluvium. All water for domestic consumption is provided by the Easter Municipal Water District. Even if site groundwater were impacted, it would most likely not migrate more than a few hundred feet, and not the 1.5 miles needed to impact an aquifer utilized for agriculture irrigation. The second criterion has been met, as no BTEX compounds have been detected in groundwater at Site 35c.

Parsons ES proposes collecting additional soil samples from in and around the former tank bed, the most likely location of any remaining soil contamination potentially threatening to site groundwater. Site closure soil samples will be analyzed for BTEX, methyl tertiary butyl ether (MTBE) and total petroleum hydrocarbons as diesel (TPH-d) as described in Section 4. If soil samples have analytical results above detection limits, leaching analysis will be performed using VLEACH, a one-dimensional finite difference vadose zone leaching model. The model is designed to simulate the leaching of a volatile sorbed contaminant through the vadose zone. Use of the VLEACH model was recommended by the RWQCB. If the leaching potential of the remaining site contamination is below the "low-risk" threshold described above, site closure and no further remedial action will be requested.

SECTION 4

SITE CLOSURE SAMPLING AND ANALYSIS PLAN

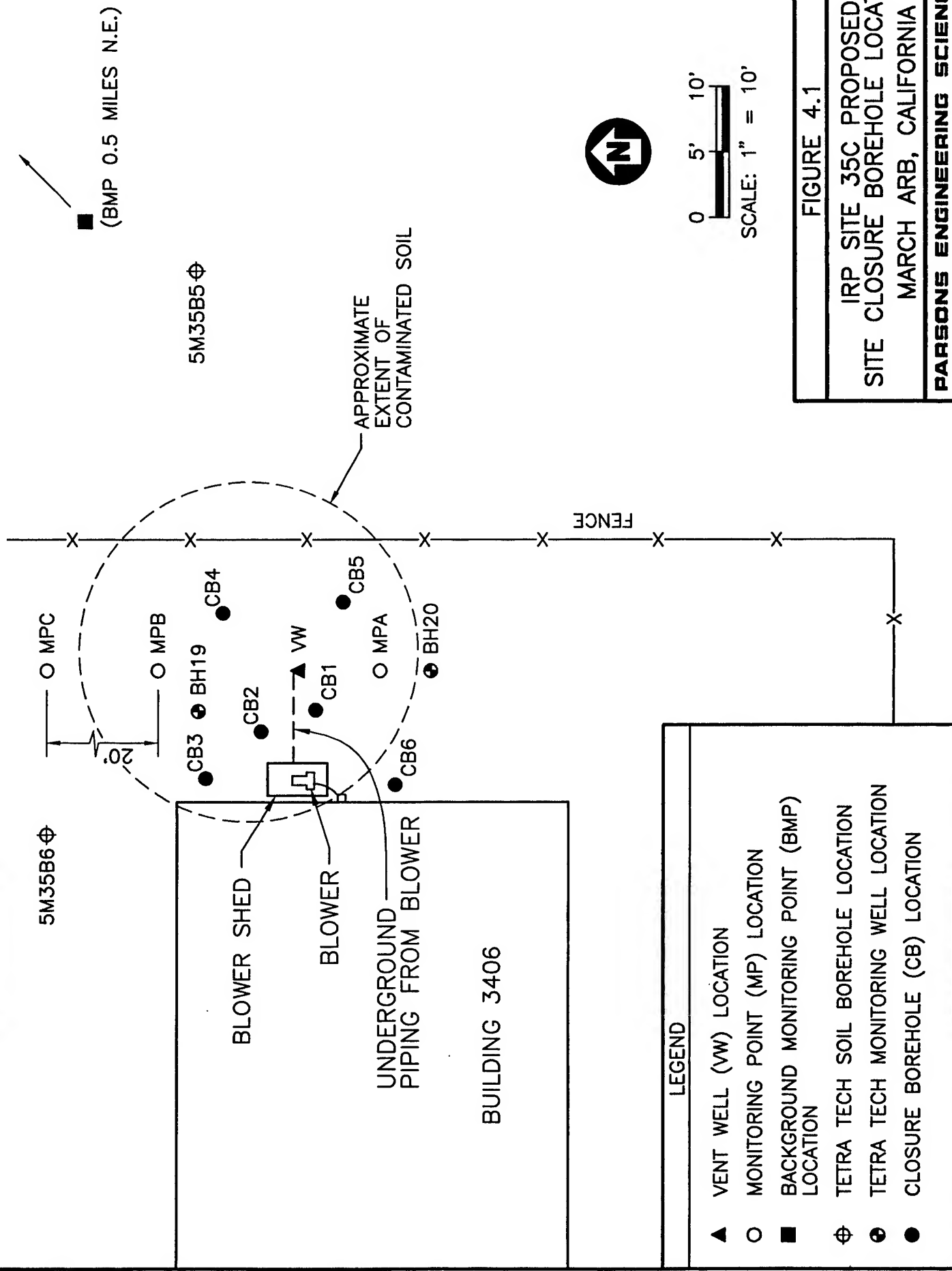
The following SAP describes: closure borehole locations and sampling depths; soil sampling procedures; and analytical methods proposed to collect sufficient data to support site closure. This plan has been prepared and will be implemented by a California Registered Geologist.

4.1 SITE CLOSURE BOREHOLE LOCATIONS AND SAMPLING DEPTHS

To confirm that site contamination has been remediated to within acceptable levels, Parsons ES proposes to drill six additional boreholes and collect confirmation samples. Proposed borehole locations are shown on Figure 4.1. The first two boreholes will attempt to locate the former tank pit. The four remaining boreholes will be located approximately 10 to 15 feet from the first two borehole. If field evidence of contamination is detected in any of these four boreholes, subsequent boreholes will be located farther from the tank pit.

Boreholes will be drilled to 14 feet bgs or to the groundwater table, whichever is encountered first. Soil samples will be collected at 6, 9, and 14 feet bgs. The 6-foot-deep sample corresponds to the approximate depth of the former tank bed and was the depth at which the highest field evidence of contamination was detected during bioventing pilot testing. If field evidence of contamination is detected at 14 feet bgs, sampling will continue at 2-foot intervals until two consecutive samples have no field evidence of contamination. All samples with field evidence of contamination will be analyzed as described in Subsection 4.3. A minimum of two samples from boreholes with no field evidence of contamination will be analyzed to confirm non-detect screening results.

In the unlikely event that analytical results indicate additional site remediation is required, the VW and MPA and MPB will not be abandoned at this time. MPC and the background MP, both located in clean soil, will be abandoned by drilling out and backfilling with bentonite chips. Should site closure be granted, March ARB will make



arrangements for the VW and MP to be properly abandoned (abandonment is not currently included in the Parsons ES Scope of Work).

4.2 DRILLING, SAMPLING, AND EQUIPMENT DECONTAMINATION

Boreholes will be advanced using a drill rig equipped with 6-inch outside-diameter (OD) hollow-stem augers. Soil cuttings generated during drilling will be placed on plastic sheeting. The soil pile will be covered at the end of the day with additional plastic sheets pending laboratory results. It is anticipated that the majority of soil will have no detectable hydrocarbon contamination and that all soil will have non-hazardous concentrations of hydrocarbons. If so, soil cuttings will be disposed of at the base Class III sanitary landfill as directed by the Base Point of Contact. Soil with hazardous concentrations of hydrocarbons (if any) will be disposed of by a licensed hazardous waste hauler at a Treatment Storage Disposal Facility off base.

Boreholes will be logged by a Parsons ES geologist. Soil types will be classified according to the Unified Soil Classification System (USCS) and described in accordance with the standard Parsons ES soil description format.

Before use and between boreholes, augers and other downhole equipment will be cleaned to prevent cross-contamination. Cleaning will be accomplished using a high-pressure hot-water wash, followed by a potable water rinse. Decontamination fluids will be collected and contained in labeled 55-gallon drums. The drums will be emptied at the base waste water treatment plant as directed by the Base Point of Contact.

Soil samples will be collected in a 2.5-inch inside-diameter (ID) split-barrel sampler that will be lowered through the hollow stem of the augers and driven approximately 1.5 feet (or to refusal, if shallower) into undisturbed soil, ahead of the augers. Between sampling events, the split-barrel sampler will be cleaned with Alconox[®] detergent, followed by successive potable and distilled water rinses.

The split-sampler will be fitted with three precleaned, 2.5-inch OD by 6-inch-long, thin-walled, brass sleeves. Before samples are collected, sample sleeves will be cleaned using the same procedure as that for the sampler. After collection of a sample, the sampler will be retrieved, split apart, and the sleeves will be removed. The ends of the lowest sleeve that contains the sample for chemical analysis will be covered with Teflon[®] sheets and plastic end caps.

The upper sample sleeves will be used for logging purposes, and will be screened in the field for organic vapors using a photo ionization detector (PID) and a total volatile hydrocarbon analyzer (TVHA). The data obtained from the logging and screening will be recorded on the borehole logs.

The sleeves for chemical analysis will be labeled with the site name and borehole number, sample depth, date of collection, project name, and other pertinent data. These sleeves will be placed immediately in an insulated shipping container with ice, and will be maintained in a chilled condition until delivered to the analytical laboratory. Chain-

of-custody records will be prepared in the field and will accompany the samples to the analytical laboratory.

After sampling, boreholes will be backfilled with bentonite chips (hole plug) to approximately 1 foot bgs. The bentonite will be hydrated during placement at a rate of 2 to 5 gallons of water per 50-pound bag of chips. A concrete cap approximately 1-foot thick will be placed on top of the bentonite.

4.3 SOIL SAMPLE ANALYSIS

All samples will be analyzed by a state of California-certified and AFCEE-approved laboratory. Parsons ES proposes analyzing all soil samples by EPA Method SW8020 modified for BTEX and MTBE, and by EPA Method SW8015 modified for TPH-d. Two samples also will be analyzed for total organic carbon (TOC) by the Walkley-Black titration method. TOC is required for the VLEACH model. Proposed practical quantitation limits for SW8020 and SW8015 are presented in Table 4.1.

Table 4.1
Practical Quantitation Limits
IRP Site 35c, Former Diesel UST
March ARB, California

Analytical Method	PQL (mg/kg)^{a/}
EPA SW8020 Modified	
Benzene	0.001
Toluene	0.005
Ethylbenzene	0.005
Xylenes	0.005
Methyl Tertiary Butyl Ether	0.05
EPA SW8015 Modified	
TPH-d	10.0

^{a/} PQL = practical quantitation limit; mg/kg = milligrams per kilogram

4.4 COMPLIANCE WITH MARCH ARB OU-2 SAP

A Sampling and Analysis Plan for operable unit 2 (OU-2) was prepared by Tetra Tech. IRP site 35c lies within OU-2. The Base and the RWQCB has requested that the previously described closure activities be conducted under provisions established in the OU-2 SAP. Unfortunately, several provisions of the OU2-SAP is out of the scope of the contract under which site closure sampling is being conducted. The OU-2 SAP will be complied with except for the following.

- 1) Subsection 1.5.2 of the OU-2 SAP states that samples will be sent to Eureka Laboratories. The laboratory under contract to Parsons ES for the AFCEE Extended Bioventing project is Inchcape Testing Services of Richardson, Texas, an AFCEE-approved and State of California-certified analytical laboratory. Parsons ES proposes to send soil samples to Inchcape Testing Services for analysis.
- 2) Table 1.8-1 of the OU-2 SAP lists the PQLs (practical quantitation limits) for toluene, ethylbenzene, xylenes, and total extractable fuel hydrocarbons (TEFH) as 0.001, 0.001, 0.001, and 5.0 mg/kg, respectively. Parsons ES has specified PQLs of 0.005, 0.005, 0.005 and 10 mg/kg, respectively. These PQLs are low enough to determine if action levels proposed in Section 3 of the draft SAP for IRP Site 35c have been attained using bioventing.
- 3) Subsection 1.11.3 of the OU-2 SAP calls for the contractor to audit the laboratory. Parsons ES is not planning to perform a laboratory audit specifically for the project at March ARB, but Inchcape Testing Services has been audited in the past and will be audited again in the near future. Inchcape Testing Services has successfully passed audits conducted previously by Parsons ES.
- 4) Subsection 2.4 of the OU-2 SAP requires all boreholes to be surveyed to the nearest 0.1 foot by a licensed surveyor. Parsons ES proposes to identify borehole locations with respect to existing buildings using a measuring tape during the field effort. An accurate plot plan showing the location of all bioventing-related boreholes with respect to existing buildings will be provided in the closure report.
- 5) Subsection 2.5.7 of the OU-2 SAP included a provision that at least one borehole at each site be continuously cored. The geology at Site 35c has been well-characterized during previous investigations by Tetra Tech and Parsons ES. Therefore, continuous coring would not provide any new information regarding the subsurface at IRP Site 35c, and is not proposed for this effort. Parsons ES will collect soil samples at three depth intervals from each borehole using a split-spoon sampler to collect soil samples and characterize the soil.
- 6) Subsection 2.5.8 of the OU-2 SAP requires boreholes to be abandoned by grouting with a concrete bentonite slurry. In the draft SAP for IRP Site 35c, Parsons ES has

proposed to use bentonite chips, placed in lifts with each lift hydrated in place, with a concrete cap placed over the bentonite. Our proposed method of borehole abandonment is less costly than the method outlined in the OU-2 SAP, and is more effective in preventing infiltration of surface water. Slurries tend to dry out and shrink over time.

- 7) Subsection 2.6.1.1 of the OU-2 SAP describes a decontamination procedure for soil sampling equipment that calls for the use of methanol and hexane. Parsons ES proposes to use only potable water and deionized water for equipment decontamination. Methanol and hexane are often used if compounds with very low water solubilities, such as pesticides, are contaminants of concern. BTEX compounds, MTBE, and most of the compounds that are detected in TPH analyses are relatively soluble in water and therefore can be washed from equipment using water only. Using methanol and hexane for equipment decontamination is uncommon for UST-related sites. Additionally, the exposure risk to onsite workers from these decontamination fluids is significant, and the use of these decontamination fluids will create another form of investigation derived waste requiring proper disposal.

On October 17, 1996, Mr. Broderick of the RWQCB was contacted by telephone to determine if site closure could be attained given these variations from the OU-2 SAP. Mr. Broderick accepted the variations, and requested that we include a discussion of the variations in our site closure report.

SECTION 5

SITE CLOSURE REPORT FORMAT

Following receipt of the laboratory analytical results, a draft site closure report will be prepared and submitted to March ARB and AFCEE. Any comments will be incorporated into a draft final report which will be forwarded to March ARB, AFCEE, and the RWQCB. Any RWQCB comments will be addressed in the final report.

The report will contain the following information:

- Plot plans showing final borehole locations;
- Summary of field activities;
- Assessment of analytical results in comparison to "low risk" threshold criteria;
- Borehole logs;
- Laboratory analytical reports and chain-of-custody forms; and
- Conclusions and recommendations for site closure or additional cleanup action.

The report will be prepared and signed by a California Registered Geologist.

SECTION 6

REFERENCES

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APPENDIX B

BOREHOLE LOGS

MARCH ARB IRP SITE 35C SITE CLOSURE

PAGE 1 OF 1

PROJECT NO: 726876 SITE NO: IRP SITE 35C BOREHOLE NO: CBI PROJECT NAME: MARCH ARB
 DATE BEGAN: 3/21/97 DATE FINISHED: 3/21/97 FIELD GEOLOGIST: L. DUJUS
 DRILLER: CALIFORNIA PACIFIC DRILLING NORTH: UNKNOWN EAST: UNKNOWN
 GROUND SURFACE ELEV.: ~1700 feet GWL DATE/TIME: 3/21/97 0830 GWL DEPTH: 13.75 @BH20
 DRILLING METHOD: 6" OD HOLLOW-STEM AUGER DRILL EQUIP: B-53 GWL EQUIP: Waterguys
 CONTRACTOR: PARSONS ENGINEERING SCIENCE CHECKED BY: A.J.S.

ELEV (FT)	DEPTH (FT)	BLOW COUNT	PERCENT RECOVERY	PROFILE	DESCRIPTION	U. S. C. S.	VOLATILE ORGANIC VAPORS (ppm)	PID	REMARKS
1700.0	0.00								
1695.0	-5.00	40/50-4"	50		SAND: medium to coarse, angular.	SP	1.8		cuttings
					DECOMPOSED GRANITE: dark yellowish brown (10YR4/4), damp.	--			no odor
1690.0	-10.00	70/50-1"	33		DECOMPOSED GRANITE: dark gray and gray, micaceous, damp.	--	39.5		slight petroleum odor
					DECOMPOSED GRANITE: black and white, micaceous, damp.	--	110.7		slight diesel odor, total depth = 13.5'
1685.0	-15.00	75-6"	33						

MARCH ARB IRP SITE 35C SITE CLOSURE

PAGE 1 OF 1

PROJECT NO: 726876 SITE NO: IRP SITE 35C BOREHOLE NO: C32 PROJECT NAME: MARCH ARB
 DATE BEGAN: 3/21/97 DATE FINISHED: 3/21/97 FIELD GEOLOGIST: L. DUDUS
 DRILLER: CALIFORNIA PACIFIC DRILLING NORTH: UNKNOWN EAST: UNKNOWN
 GROUND SURFACE ELEV.: ~1700 feet GWL DATE/TIME: 3/21/97 0830 GWL DEPTH: 13.75' @ BH20
 DRILLING METHOD: 6" OD HOLLOW-STEM AUGER DRILL EQUIP: B-53 GWL EQUIP: Waterguys
 CONTRACTOR: PARSONS ENGINEERING SCIENCE CHECKED BY: A.J.S.

ELEV (FT)	DEPTH (FT)	BLOW COUNT	PERCENT RECOVERY	PROFILE	DESCRIPTION	U. S. C. S.	VOLATILE ORGANIC VAPORS (ppm)	PID	REMARKS
1700.0	0.00					SP			cuttings
					SAND: medium to coarse, angular.				black plastic sheeting in cuttings @ 2'
1695.0	-5.00	2/2/2	100		SAND: dark grayish brown (10YR3/2), very coarse, angular, micaceous, some silt, wet (possible tank bed backfill).	SM	5.4		no odor
		1/2/3	100		SAND AND SILT: dark grayish brown (10YR3/2), coarse, angular, micaceous, wet, (possible tank bed backfill).	SM	12.2		very slight petroleum odor
1690.0	-10.00				DECOMPOSED GRANITE: black and gray.	--	86		11' - color change (black) and moderate odor moderate diesel odor total depth = 13.0'
1685.0	-15.00	47/70-4"	50						

MARCH ARB IRP SITE 35C SITE CLOSURE

PAGE 1 OF 1

PROJECT NO: 726876 SITE NO: IRP SITE 35C BOREHOLE NO: CB3 PROJECT NAME: MARCH ARB
 DATE BEGAN: 3/21/97 DATE FINISHED: 3/21/97 FIELD GEOLOGIST: L. DUDUS
 DRILLER: CALIFORNIA PACIFIC DRILLING NORTH: UNKNOWN EAST: UNKNOWN
 GROUND SURFACE ELEV.: ~1700 feet GWL DATE/TIME: 3/21/97 0830 GWL DEPTH: 13.75 @BH20
 DRILLING METHOD: 6" OD HOLLOW-STEM AUGER DRILL EQUIP: B-53 GWL EQUIP: Waterguys
 CONTRACTOR: PARSONS ENGINEERING SCIENCE CHECKED BY: A.J.S.

ELEV (FT)	DEPTH (FT)	BLOW COUNT	PERCENT RECOVERY	PROFILE	DESCRIPTION	U. S. C. S.	VOLATILE ORGANIC VAPORS (ppm)	PID	REMARKS
1700.0	0.00								
1695.0	-5.00	19/24/37	100		SAND: medium to coarse, angular.	SP	0.0		cuttings
		70-6"	33		SAND AND SILT: dark brown, very coarse, angular, damp.	SM	62.1		possible fill/disturbed
1690.0	-10.00				DECOMPOSED GRANITE: dark brown black, damp.	--			slight petroleum odor
1685.0	-15.00	77-6"	33			--	44.6		total depth = 13.5'

MARCH ARB IRP SITE 35C SITE CLOSURE

PAGE 1 OF 1

PROJECT NO: 726876 SITE NO: IRP SITE 35C BOREHOLE NO: CB4 PROJECT NAME: MARCH ARB
 DATE BEGAN: 3/21/97 DATE FINISHED: 3/21/97 FIELD GEOLOGIST: L. DUDUS
 DRILLER: CALIFORNIA PACIFIC DRILLING NORTH: UNKNOWN EAST: UNKNOWN
 GROUND SURFACE ELEV.: ~1700 feet GWL DATE/TIME: 3/21/97 0830 GWL DEPTH: 13.75' @BH20
 DRILLING METHOD: 6" OD HOLLOW-STEM AUGER DRILL EQUIP: B-53 GWL EQUIP: Waterguys
 CONTRACTOR: PARSONS ENGINEERING SCIENCE CHECKED BY: A.J.S.

ELEV (FT)	DEPTH (FT)	BLOW COUNT	PERCENT RECOVERY	PROFILE	DESCRIPTION	U. S. C. S.	VOLATILE ORGANIC VAPORS (ppm)	PID	REMARKS
1700.0	0.00				SAND: medium to coarse, angular.	SP			cuttings
1695.0	-5.00	70-6"	33		DECOMPOSED GRANITE: dark brown, micaceous, damp.	--	0.8		no odor
1690.0	-10.00	100-6"	33			--	5.3		no odor
1685.0	-15.00	90-6"	33			--	0.5		no odor total depth = 13.5'

MARCH ARB IRP SITE 35C SITE CLOSURE

PAGE 1 OF 1

PROJECT NO: 726876 SITE NO: IRP SITE 35C BOREHOLE NO: 35
 DATE BEGAN: 3/21/97 DATE FINISHED: 3/21/97 PROJECT NAME: MARCH ARB
 DRILLER: CALIFORNIA PACIFIC DRILLING NORTH: UNKNOWN FIELD GEOLOGIST: L. DUDUS
 GROUND SURFACE ELEV.: ~1700 feet GWL DATE/TIME: 3/21/97 0830 EAST: UNKNOWN
 DRILLING METHOD: 6" OD HOLLOW-STEM AUGER DRILL EQUIP: B-53 GWL DEPTH: 13.75' @ BH20
 GWL EQUIP: Waterguys
 CONTRACTOR: PARSONS ENGINEERING SCIENCE CHECKED BY: A.J.S.

ELEV (FT)	DEPTH (FT)	BLOW COUNT	PERCENT RECOVERY	PROFILE	DESCRIPTION	U. S. C. S.	VOLATILE ORGANIC VAPORS (ppm)	PID	REMARKS
1700.0	0.00				SAND: medium to coarse, angular.	SP			cuttings
1695.0	5.00	90-6"	33		DECOMPOSED GRANITE: dark brown, micaceous, damp.	--	0.3		no odor
		80-6"	33		DECOMPOSED GRANITE: black, gray, dark brown, micaceous, damp.	--	2.3		no odor
1690.0	10.00				DECOMPOSED GRANITE: black and gray, micaceous, damp.	--	1.7		no odor
1685.0	15.00	65-6"	33						total depth = 13.5'

MARCH ARB IRP SITE 35C SITE CLOSURE

PAGE 1 OF 1

PROJECT NO: 726876 SITE NO: IRP SITE 35C BOREHOLE NO: C86 PROJECT NAME: MARCH ARB
 DATE BEGAN: 3/21/97 DATE FINISHED: 3/21/97 FIELD GEOLOGIST: L. DUJUS
 DRILLER: CALIFORNIA PACIFIC DRILLING NORTH: UNKNOWN EAST: UNKNOWN
 GROUND SURFACE ELEV.: ~1700 feet GWL DATE/TIME: 3/21/97 0830 GWL DEPTH: 13.75' @BH20
 DRILLING METHOD: 6" OD HOLLOW-STEM AUGER DRILL EQUIP: B-53 GWL EQUIP: Waterguys

CONTRACTOR: PARSONS ENGINEERING SCIENCE CHECKED BY: A.J.S.

ELEV (FT)	DEPTH (FT)	BLOW COUNT	PERCENT RECOVERY	P R O F I L E	DESCRIPTION	U. S. C. S.	VOLATILE ORGANIC VAPORS (ppm)	REMARKS
							PID	
-1700.0	0.00				SAND: medium to coarse, angular.	SP		cuttings
-1695.0	-5.00	31/50	66		DECOMPOSED GRANITE: dark gray and gray, micaceous, damp.	--	39.8	no odor
-1690.0	-10.00	60-6"	33			--	6.4	no odor
-1685.0	-15.00	80-6"	33		DECOMPOSED GRANITE: black and white, damp.	--	1.5	total depth = 13.5'

APPENDIX C

LABORATORY ANALYTICAL RESULTS



Intertek Testing Services
Environmental Laboratories

CUSTOMER: PARSONS ENGINEERING SCIENCE, Inc.

REPORT NUMBER: D97-3469
SAMPLES RECEIVED: 24-March-1997

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592

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Intertek Testing Services
Environmental Laboratories

CASE NARRATIVE



Intertek Testing Services Environmental Laboratories

DATE RECEIVED: 24-MAR-1997

REPORT NUMBER: D97-3469

REPORT DATE: 3-MAR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

PROJECT : 726876.49123 AFCEE Bioventing

CASE NARRATIVE SUMMARY

This is an ITS Level 3 data package, containing results for the analysis of volatile and semivolatile organics by EPA methodology.

EPA Method 8020 Volatile Aromatics Analysis

Sample Dilutions

Samples D97-3469-6, -14 and -15 were analyzed at 1:5 dilutions, due to high levels of non-target hydrocarbons. Most target analytes were reported as non-detected at these dilutions.

Surrogate Recoveries

Samples D97-3469-6, -14 and -15 reported recoveries for the surrogate bromofluorobenzene outside of QC limits, due to matrix interference from high levels of non-target hydrocarbons.

Internal Standard Areas

Samples D97-3469-1, -2, -4, -5 and -10 reported areas for the internal standard fluorobenzene outside of QC limits, due to matrix interference, and poor purging efficiency. Therefore, the samples were reanalyzed, with similar results, confirming matrix interference.

EPA Method 8015M Total Extractable Petroleum Hydrocarbons Analysis

Sample Dilutions

Samples D97-3469-1 and -2 were analyzed at 1:10 dilutions, due to high levels of target analytes. Samples D97-3469-3, -5, -6, -14 and -15 were analyzed at 1:5 dilutions, due to high levels of target analytes.



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Parsons Engineering Science
page 2


Matrix Spike Analysis

For the matrix spike/matrix spike duplicate analyses of soil sample D97-3469-2, the recoveries for total extractable petroleum hydrocarbons were outside of the QC limits of 30.0-150%, because the concentration of this analyte in the unspiked sample was much greater than the spiking level of 83.3 mg/Kg. Since the blank spike/blank spike duplicate analyses were within QC limits, the results were accepted.

Due to limited sample availability, the aqueous matrix spike analyses were conducted using reagent water. Therefore, these analyses were reported as blank spike/blank spike duplicate analyses.

No further observations were documented during the sample analysis for this project.

If there are any questions, feel free to contact Ms. Janice McKittrick, at (972) 238-5591.


Alan Humason
QA Coordinator



Intertek Testing Services

Environmental Laboratories

JOB ID : D97-3469
CUSTOMER : Parsons Engineering Science
PROJECT : 726876.49123 AFCEE Bioventing

SAMPLE ID : D97-3469-1 DATE SAMPLED : 21-MAR-1997
ID MARKS : CB2# N1#(5.5-6')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64020G

SAMPLE ID : D97-3469-2 DATE SAMPLED : 21-MAR-1997
ID MARKS : CB2# N1#(8.5-9')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64020G

SAMPLE ID : D97-3469-3 DATE SAMPLED : 21-MAR-1997
ID MARKS : CB2# N1#(12.5-13')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
LOS_BTXS1 /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
LOS_BTXS2 /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64020G

SAMPLE ID : D97-3469-4 DATE SAMPLED : 21-MAR-1997
ID MARKS : CB1# N1#(5-5.5')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	25-MAR-1997	MKS	25-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34



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SAMPLE ID : D97-3469-4 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB1# N1#(5-5.5')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
SOLID_TPER /1			SAB	31-MAR-1997	64020G

SAMPLE ID : D97-3469-5 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB1# N1#(10-10.5')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64020G

SAMPLE ID : D97-3469-6 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB1# N1#(13-13.5')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
LOS_BTXS1 /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
LOS_BTXS2 /1	MKS	27-MAR-1997	MKS	27-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64020G

SAMPLE ID : D97-3469-7 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB6# N1#(5.5-6')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	25-MAR-1997	MKS	25-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64020G

SAMPLE ID : D97-3469-8 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB6# N1#(8.5-9')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001



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SAMPLE ID : D97-3469-8 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB6# N1#(8.5-9')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64020G

SAMPLE ID : D97-3469-9 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB5# N1#(8.5-9')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64020G

SAMPLE ID : D97-3469-10 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB5# N1#(13-13.5')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	25-MAR-1997	MKS	25-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64020G

SAMPLE ID : D97-3469-11 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB4# N1#(8.5-9')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64021H

SAMPLE ID : D97-3469-12 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB4# N1#(13-13.5')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	25-MAR-1997	MKS	25-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34



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Environmental Laboratories

SAMPLE ID : D97-3469-12 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB4# N1#(13-13.5')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
SOLID_TPER /1			SAB	31-MAR-1997	64021H

SAMPLE ID : D97-3469-13 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB3# N1#(6.5-7')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	25-MAR-1997	MKS	25-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64021H

SAMPLE ID : D97-3469-14 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB3# N1#(8.5-9')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
LOS_BTXS1 /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
LOS_BTXS2 /1	MKS	27-MAR-1997	MKS	27-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64021H

SAMPLE ID : D97-3469-15 DATE SAMPLED : 21-MAR-1997 ID MARKS : CB3# N1#(13-13.5')					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
LOS_BTXS1 /1	MKS	26-MAR-1997	MKS	26-MAR-1997	0325802001
LOS_BTXS2 /1	MKS	27-MAR-1997	MKS	27-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	27-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64021H



Intertek Testing Services Environmental Laboratories

JOB ID : D97-3469
CUSTOMER : Parsons Engineering Science
PROJECT : 726876.49123 AFCEE Bioventing

SAMPLE ID : D97-3469-16 DATE SAMPLED : 21-MAR-1997
ID MARKS : FIELDQC# TB1#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXL /1	VHT	28-MAR-1997	CNA	28-MAR-1997	0328802001

SAMPLE ID : D97-3469-17 DATE SAMPLED : 21-MAR-1997
ID MARKS : FIELDQC# EB1#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXL /1	VHT	28-MAR-1997	CNA	28-MAR-1997	0328802001
RBN_TEHL /1	HCS	25-MAR-1997	VHL	26-MAR-1997	AC052-39

SAMPLE ID : D97-3469-18 DATE SAMPLED : 21-MAR-1997
ID MARKS : LABQC# LB1#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	25-MAR-1997	MKS	25-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	25-MAR-1997	AC052-34

SAMPLE ID : D97-3469-19 DATE SAMPLED : 21-MAR-1997
ID MARKS : LABQC# BS1#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	25-MAR-1997	MKS	25-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34

SAMPLE ID : D97-3469-20 DATE SAMPLED : 21-MAR-1997
ID MARKS : CB2# MS1#(8.5-9')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	25-MAR-1997	MKS	25-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64020G



Intertek Testing Services Environmental Laboratories

JOB ID : D97-3469
CUSTOMER : Parsons Engineering Science
PROJECT : 726876.49123 AFCEE Bioventing

SAMPLE ID : D97-3469-21 DATE SAMPLED : 21-MAR-1997
ID MARKS : CB2# SD1#(8.5-9')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXS /1	MKS	25-MAR-1997	MKS	25-MAR-1997	0325802001
RBN_TEHS /1	CLT	25-MAR-1997	VHL	26-MAR-1997	AC052-34
SOLID_TPER /1			SAB	31-MAR-1997	64020G

SAMPLE ID : D97-3469-22 DATE SAMPLED : 22-MAR-1997
ID MARKS : LABQC# LB1#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXL /1	VHT	28-MAR-1997	CNA	28-MAR-1997	0328802001
RBN_TEHL /1	HCS	25-MAR-1997	VHL	25-MAR-1997	AC052-39

SAMPLE ID : D97-3469-23 DATE SAMPLED : 22-MAR-1997
ID MARKS : LABQC# BS1#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
LOS_BTXL /1	VHT	28-MAR-1997	CNA	28-MAR-1997	0328802001
RBN_TEHL /1	HCS	25-MAR-1997	VHL	25-MAR-1997	AC052-39

ANALYSIS	DESCRIPTION
LOS_BTXS	BTEX/MTBE, Solid, LA AirStation, IRPIMS/AFCEE
RBN_TEHS	IRPIMS TEH for Bioventing Project, Solid
SOLID_TPER	Total Solids, Soil/Sludge, %
LOS_BTXS1	BTEX/MTBE, Solid, LA AirStation, IRPIMS/AFCEE
LOS_BTXS2	BTEX/MTBE, Solid, LA AirStation, IRPIMS/AFCEE
LOS_BTXL	BTEX/MTBE, Liquid, LA AirStation, IRPIM/AFCEE
RBN_TEHL	IRPIMS TEH for Bioventing Project, Liquid



Intertek Testing Services

Environmental Laboratories

JOB ID : D97-4451
CUSTOMER : Handex of Colorado
PROJECT : 112458.04 Denver, CO.

SAMPLE ID : D97-4451-1 DATE SAMPLED : 10-APR-1997
ID MARKS : MW-1 Amoco SS # 8606

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_HOC_ML /1			VHT	15-APR-1997	34041597HOC
MTBE8020ML /1			VHT	15-APR-1997	34-041597MML
TPH_8015ML /1			VHT	15-APR-1997	33-041597ML

SAMPLE ID : D97-4451-2 DATE SAMPLED : 10-APR-1997
ID MARKS : MW-2 Amoco SS # 8606

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_HOC_ML /1			CNA	14-APR-1997	34041497AHOC
MTBE8020ML /2			VHT	17-APR-1997	34-041797MML
TPH_8015ML /1			VHT	14-APR-1997	33-041497AML

SAMPLE ID : D97-4451-3 DATE SAMPLED : 10-APR-1997
ID MARKS : MW-3 Amoco SS # 8606

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_HOC_ML /1			VHT	15-APR-1997	34041597HOC
MTBE8020ML /1			VHT	15-APR-1997	34-041597MML
TPH_8015ML /1			VHT	15-APR-1997	33-041597ML

SAMPLE ID : D97-4451-4 DATE SAMPLED : 10-APR-1997
ID MARKS : MW-4 Amoco SS # 8606

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_HOC_ML /1			CNA	15-APR-1997	34041497AHOC
MTBE8020ML /1			VHT	15-APR-1997	34-041597MML
TPH_8015ML /1			VHT	15-APR-1997	33-041497AML

ITS Intertek Testing Services Environmental Laboratories

GC ANALYSIS, SOIL

Formulas used for calculations

$$\text{Concentration } (\mu\text{g/L}) = \frac{(A_x) (I_s) (V_t) (Df)}{(A_{is}) (RRF) (V_i) (W_s) (D)}$$

Where:

- A_x = Area of the peak for the compound to be measured.
 A_{is} = Area of the peak for the internal standard.
 I_s = Amount of internal standard injected in nanograms (ng).
 V_i = Volume of extract injected (μL).
 V_t = Volume of concentrated extract in microliters (μL).
 Df = Dilution factor. (see below)
 RRF = Relative response factor. (see below)
 D = $\frac{100 - \% \text{ moisture}}{100}$
 W_s = Weight of sample extracted in grams (g).

Dilution factor =

$$\frac{\mu\text{L most conc. extract used to make dilution} + \mu\text{L clean solvent}}{\mu\text{L most conc. extract used to make dilution}}$$

If no dilution is performed, $Df = 1.0$

$$\text{Relative Response Factor} = \frac{A_x}{A_{is}} \times \frac{C_{is}}{C_x}$$

- A_x = Area of the peak for the compound to be measured.
 A_{is} = Area of the peak for the specific internal standard.
 C_{is} = Concentration of the internal standard ($\mu\text{g/mL}$).
 C_x = Concentration of the compound to be measured ($\mu\text{g/mL}$).

GC ANALYSIS, WATER

Formulas used for calculations

$$\text{Concentration } (\mu\text{g/L}) = \frac{(A_x) (I_s) (V_t) (Df)}{(A_{is}) (RRF) (V_o) (V_i)}$$

Where:

- A_x = Area of the peak for the compound to be measured.
 A_{is} = Area of the peak for the internal standard.
 I_s = Amount of internal standard injected in nanograms (ng).
 V_o = Volume of water extracted in milliliters (mL).
 V_i = Volume of extract injected (μL).
 V_t = Volume of concentrated extract in microliters (μL).
 Df = Dilution factor. (see below)
 RRF = Relative response factor. (see below)

Dilution factor =

$$\frac{\mu\text{L most conc. extract used to make dilution} + \mu\text{L clean solvent}}{\mu\text{L most conc. extract used to make dilution}}$$

If no dilution is performed, $Df = 1.0$

$$\text{Relative Response Factor} = \frac{A_x}{A_{is}} \times \frac{C_{is}}{C_x}$$

- A_x = Area of the peak for the compound to be measured.
 A_{is} = Area of the peak for the specific internal standard.
 C_{is} = Concentration of the internal standard ($\mu\text{g/mL}$).
 C_x = Concentration of the compound to be measured ($\mu\text{g/mL}$).



Intertek Testing Services
Environmental Laboratories

CHAIN OF CUSTODY

Report to:

Company: PARSONSES

Address: 94047 GENEESEE
LA JOLLA CA 92037

Contact: LARRY DUDUS

Phone: 619 453 9650

Fax: 453 9652

Invoice to

Company: SAME

Address: _____

Contact: _____

Phone: _____

PO/ISO #: _____

Sampler's Name

LARRY DUDUS

Project Name

AFCEE BOVENTING OPTION 2

Matrix		Date		Time		G		Identifying Marks of Sample(s)		No./Type of Containers ²	
SOL		3/20/97		1400		C		CBZ 5.5-6		VOA	
		3/21/97		1418		C		CBZ 8.5-9		AG 1 Lt.	
		1000				C		CBZ 12.5-13		250 ml	
		1028				C		CBZ 5.5-5.5			
		1036				C		CBZ 10-10.5			
		1047				C		CBZ 13-13.5			
		1100				C		CBZ 5.5-6			
		1117				C		CBZ 8.5-9			
		1203				C		CBZ 8.5-9			
		1213				C		CBZ 13-13.6			

Turn around time

☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

Relinquished by: (Signature)

[Signature]

Date: 3/21/97 Time: 1452

Relinquished by: (Signature)

[Signature]

Date: 3/21/97 Time: 1618

Relinquished by: (Signature)

[Signature]

Date: _____ Time: _____

Matrix

WW - Wastewater

Container

VOA - 40 ml vial

W - Water

A/G - Amber / Or Glass 1 Liter

SD - Solid

250 ml - Glass wide mouth

S - Soil

L - Liquid

A - Air Bag

C - Charcoal tube

P/O - Plastic or other

SL - Sludge

O - Oil

Client's delivery of samples constitutes acceptance of Inchcape/ITS-Dallas terms and conditions contained in the Price Schedule.

Remarks

IRPIMS

Client cannot accept verbal changes. Please Fax written changes to 214-238-5592

Report to: Company: _____ Address: _____ Contact: _____ Phone: _____ Fax: _____		Invoice to: Company: _____ Address: _____ Contact: _____ Phone: _____ PO/SO #: _____		ANALYSIS REQUESTED BTX + MTBE EPA 802C EPA 805 DISSE		Lab use only Due Date: _____ Temp. of coolers when received (C°): 1 2 3 4 5 Custody Seal N/A Intact N/A Screened For Radioactivity <input checked="" type="checkbox"/>	
Sampler's Name _____ Sampler's Signature _____				Lab Sample ID (Lab Use Only) 20FZ 3469-11			

Proj. No.	Date	Time	C o m p	G r a b	Identifying Marks of Sample(s)	No./Type of Containers ²		
						VOA	A/G 1 LL	250 ml P/O
5	3/21/97	1249			CB4 8.5-9			
1	3/21/97	1258			CB4 13-13.5			
13	3/21/97	1351			CB3 6.5-7			
13	3/21/97	1345			CB3 8.5-9			
13	3/21/97	1351			CB3 13-13.5			
W					TRIP BLANK	✓		
W					ZINSSATE	✓		

Turn around time <input type="checkbox"/> Priority 1 or Standard <input type="checkbox"/> Priority 2 or 50% <input type="checkbox"/> Priority 3 or 100% <input type="checkbox"/> Priority 4 ERS *		* BTX (602/6020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)	
Relinquished by: (Signature) 	Date: 3/21/97 Time: 1458	Received by: (Signature) Dan Condy	Date: 3/21/97 Time: 1452
Relinquished by: (Signature) 	Date: 3/21/97 Time: 1618	Received by: (Signature) Kim Hanner	Date: 3-22-97 Time: 1000
Relinquished by: (Signature) 	Date: _____ Time: _____	Received by: (Signature) _____	Date: _____ Time: _____

Client's delivery of samples constitutes acceptance of Inchoape/ITS-Dallas terms and conditions contained in the Price Schedule.

1 Matrix WW - Wastewater VOA - 40 ml vial
 2 Container A/G - Amber / Or Glass 1 Liter
 W - Water S - Soil SD - Solid L - Liquid 250 ml - Glass wide mouth
 A/G - Amber / Or Glass 1 Liter
 SL - Sludge O - Oil
 C - Charcoal tube P/O - Plastic or other

Inchoape cannot accept verbal changes.
 Please Fax written changes to
 214-238-5592

OFFICE USE ONLY

COOLER RECEIPT FORM

Date Received: 3-22-97 Project: 726876 49123 AFCE E Bioventing
 Date Logged-in: 3/22/97 Received by: K. Hamey
 No. of coolers received: 1 Cooler Numbers: 637

1	Shipping slip. If yes, carrier and bill number: <u>Fed Ex 4603116954</u>	<input checked="" type="radio"/> Yes	No
2	Custody seals on cooler. If yes, how many and where:	<input checked="" type="radio"/> Yes	No
3	Custody seals intact.	<input checked="" type="radio"/> Yes	No
4	Chain of Custody in plastic.	<input checked="" type="radio"/> Yes	No
5	Chain of Custody filled out properly.	<input checked="" type="radio"/> Yes	No
6	Client signed Chain of Custody.	<input checked="" type="radio"/> Yes	No
7	Samples shipped on ice. If no, temperature of cooler:	<input checked="" type="radio"/> Yes	No
8	All bottles sealed.	Yes	<input checked="" type="radio"/> No
9	All bottles received intact.	<input checked="" type="radio"/> Yes	No
10	Labels in good condition and complete.	<input checked="" type="radio"/> Yes	No
11	Sample labels agree with Chain of Custody.	<input checked="" type="radio"/> Yes	No
12	Correct containers used.	<input checked="" type="radio"/> Yes	No
13	Correct preservative used.	<input checked="" type="radio"/> Yes	No
14	Sufficient sample provided.	<input checked="" type="radio"/> Yes	No
15	Bubbles absent from VOA. <u>Rinsate/Tripblank 1 med.</u>	Yes	<input checked="" type="radio"/> No
16	Comments (use corrective action form if necessary): <u>bubble</u> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		

** If client or project manager need to be notify for any reason, please use the Case Narrative/Corrective Action green form.

SAMPLE PRESERVATION INFORMATION SHEET

[illegible]

The initial pH is determined in accordance with EPA methods 150.1 / SW-846 9040 using a sample aliquot which has been adjusted to $20 \pm 2^\circ\text{C}$



Intertek Testing Services Environmental Laboratories

4603116954

3-21-97

LARRY DUDUS

609 453-9650

092104176

PARSONS ENGINEERING SCIENCE, INC.

9404 GENESEE AVE, SUITE 140

LA JOLLA

CA 92037

726876.49123

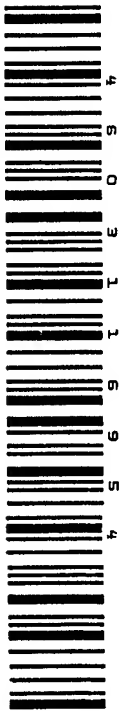
JANICE HICKITRICK 214 238-5591

INCHCAPE TESTING SERVICES

1089 EAST COLLINS BLVD,

RICHARDSON

TX 75081



272

Rev. Date 6/96
Page 11/267

CODE 307

Intertek Testing Services NA Inc.

1089 East Collins Boulevard Richardson, TX 75081

Telephone (972) 238-5591 Fax (972) 238-5592



Intertek Testing Services
Environmental Laboratories

ANALYTICAL RESULTS

ITS Intertek Testing Services
Environmental Laboratories

ANALYTICAL REPORT

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469

REPORT DATE : 1-APR-1997

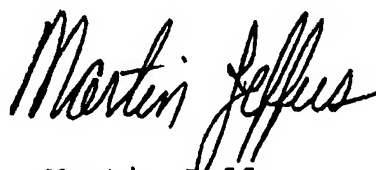
SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 9404 Genesee #140
 : La Jolla, CA 92037
ATTENTION : Mr. Larry Dudus
PROJECT : 726876.49123 AFCEE Bioventing

Included in this data package are the analytical results for the sample group which you have submitted to Intertek Testing Services for analysis. These results are representative of the samples as received by the laboratory.

The information contained herein has undergone extensive review and is deemed accurate and complete. Sample analysis and quality control were performed in accordance with all applicable protocols. Please refrain from reproducing this report except in its entirety.

If you have any questions regarding this report and its associated materials please call your Project Manager at (214) 238-5591.

We appreciate the opportunity to serve you and look forward to providing continued service in the future.



Martin Jeffus
General Manager



Intertek Testing Services
Environmental Laboratories

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-1

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: N1#(5.5-6')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0011 mg/Kg	< 0.0011 mg/Kg	U
Toluene	0.0022 mg/Kg	< 0.0022 mg/Kg	U
Ethyl benzene	0.0022 mg/Kg	< 0.0022 mg/Kg	U
m,p-Xylene	0.0022 mg/Kg	0.0015 mg/Kg	J
o-Xylene	0.0022 mg/Kg	< 0.0022 mg/Kg	U
Methyl tertiary butyl ether	0.0022 mg/Kg	< 0.0022 mg/Kg	U
Bromofluorobenzene (SS)		0.0368 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-1

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: N1#(5.5-6')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 10

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Extractable Hydrocarbons	108	mg/Kg	D
Triacontane (SS)		8.3 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-1

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: N1#(5.5-6')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Total Solids	/1	0.01 %	92.4 %
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64020G			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-2

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0011 mg/Kg	< 0.0011 mg/Kg	U
Toluene	0.0023 mg/Kg	< 0.0023 mg/Kg	U
Ethyl benzene	0.0023 mg/Kg	< 0.0023 mg/Kg	U
m,p-Xylene	0.0023 mg/Kg	< 0.0023 mg/Kg	U
o-Xylene	0.0023 mg/Kg	< 0.0023 mg/Kg	U
Methyl tertiary butyl ether	0.0023 mg/Kg	< 0.0023 mg/Kg	U
Bromofluorobenzene (SS)		0.0309 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-2

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 10

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Extractable Hydrocarbons	114	mg/Kg	D
Triacotane (SS)		8.5	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-2

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	87.4	%
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64020G					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-3

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: N1#(12.5-13')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0010 mg/Kg	0.0006 mg/Kg	J
Toluene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Ethyl benzene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
m,p-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
o-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Methyl tertiary butyl ether	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Bromofluorobenzene (SS)		0.0670 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-3

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: N1#(12.5-13')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 C1 /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0010 mg/Kg	0.0006 mg/Kg	J
Toluene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Ethyl benzene	0.0021 mg/Kg	0.0247 mg/Kg	
m,p-Xylene	0.0021 mg/Kg	0.0619 mg/Kg	
o-Xylene	0.0021 mg/Kg	0.0423 mg/Kg	
Methyl tertiary butyl ether	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Bromofluorobenzene (SS)		0.0670 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-3

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: N1#(12.5-13')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 C2 /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Ethyl benzene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
m,p-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
o-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Bromofluorobenzene (SS)		0.0649 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-3

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: N1#(12.5-13')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	51.5 mg/Kg	2190 mg/Kg	D
Triacontane (SS)		7.53 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-3

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: N1#(12.5-13')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	97.0	%
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64020G					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-4

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB1#

: N1#(5-5.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 25-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0011 mg/Kg	< 0.0011 mg/Kg	U
Toluene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Ethyl benzene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
m,p-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
o-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Methyl tertiary butyl ether	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Bromofluorobenzene (SS)		0.0575 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-4

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB1#

: N1#(5-5.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Total Extractable Hydrocarbons	10.6	mg/Kg	< 10.6 mg/Kg	U
Triacontane (SS)			8.98 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-4

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB1#

: N1#(5-5.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Total Solids	/1	0.01 %	94.0 %
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64020G			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-5

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB1#

: N1#(10-10.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0010 mg/Kg	< 0.0010 mg/Kg	U
Toluene	0.0020 mg/Kg	< 0.0020 mg/Kg	U
Ethyl benzene	0.0020 mg/Kg	< 0.0020 mg/Kg	U
m,p-Xylene	0.0020 mg/Kg	0.0018 mg/Kg	J
o-Xylene	0.0020 mg/Kg	0.0011 mg/Kg	J
Methyl tertiary butyl ether	0.0020 mg/Kg	< 0.0020 mg/Kg	U
Bromofluorobenzene (SS)		0.0449 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-5

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB1#

: N1#(10-10.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Extractable Hydrocarbons	51.1	mg/Kg	D
Triacontane (SS)		7.31 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-5

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB1#

: N1#(10-10.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	97.9	%
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64020G					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-6

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB1#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0052 mg/Kg	< 0.0052 mg/Kg	DU
Toluene	0.0103 mg/Kg	< 0.0103 mg/Kg	DU
Ethyl benzene	0.0103 mg/Kg	< 0.0103 mg/Kg	DU
m,p-Xylene	0.0103 mg/Kg	< 0.0103 mg/Kg	DU
o-Xylene	0.0103 mg/Kg	0.244 mg/Kg	D
Methyl tertiary butyl ether	0.0103 mg/Kg	< 0.0103 mg/Kg	DU
Bromofluorobenzene (SS)		0.429 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-6

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB1#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 C1 /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0052 mg/Kg	< 0.0052 mg/Kg	DU
Toluene	0.0103 mg/Kg	< 0.0103 mg/Kg	DU
Ethyl benzene	0.0103 mg/Kg	0.0869 mg/Kg	D
m,p-Xylene	0.0103 mg/Kg	0.263 mg/Kg	D
o-Xylene	0.0103 mg/Kg	0.244 mg/Kg	D
Methyl tertiary butyl ether	0.0103 mg/Kg	< 0.0103 mg/Kg	DU
Bromofluorobenzene (SS)		0.429 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-6

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB1#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 27-MAR-1997

ANALYSIS METHOD : EPA 8020 C2 /1

ANALYZED BY : MKS

ANALYZED ON : 27-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Ethyl benzene	0.0103 mg/Kg	< 0.0103 mg/Kg	DU
m,p-Xylene	0.0103 mg/Kg	< 0.0103 mg/Kg	DU
o-Xylene	0.0103 mg/Kg	0.209 mg/Kg	D
Bromofluorobenzene (SS)		0.459 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-6

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB1#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	51.7 mg/Kg	1880 mg/Kg	D
Triacontane (SS)		8.13 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-6

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB1#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01 %		96.7 %	
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64020G					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-7

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 9404 Genesee #140
: La Jolla, CA 92037
ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : CB6#
: N1#(5.5-6')
PROJECT : 726876.49123 AFCEE Bioventing
DATE SAMPLED : 21-MAR-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MKS
PREPARED ON : 25-MAR-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 25-MAR-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0011 mg/Kg	< 0.0011 mg/Kg	U
Toluene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Ethyl benzene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
m,p-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
o-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Methyl tertiary butyl ether	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Bromofluorobenzene (SS)		0.0561 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-7

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB6#

: N1#(5.5-6')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.6 mg/Kg	13.3 mg/Kg	
Triacontane (SS)		8.87 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-7

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB6#

: N1#(5.5-6')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	94.4	%
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64020G					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-8

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB6#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0010 mg/Kg	< 0.0010 mg/Kg	U
Toluene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Ethyl benzene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
m,p-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
o-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Methyl tertiary butyl ether	0.0021 mg/Kg	0.0019 mg/Kg	J
Bromofluorobenzene (SS)		0.0599 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-8

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB6#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.3 mg/Kg	2.4 mg/Kg	J
Triacontane (SS)		8.97 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-8

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB6#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids /1		0.01 %		96.9 %	
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64020G					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-9
REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 9404 Genesee #140
: La Jolla, CA 92037
ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : CB5#
: N1#(8.5-9')
PROJECT : 726876.49123 AFCEE Bioventing
DATE SAMPLED : 21-MAR-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MKS
PREPARED ON : 26-MAR-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 26-MAR-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 0325802001

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0010 mg/Kg	< 0.0010 mg/Kg	U
Toluene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Ethyl benzene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
m,p-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
o-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Methyl tertiary butyl ether	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Bromofluorobenzene (SS)		0.0587 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-9

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB5#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.3 mg/Kg	< 10.3 mg/Kg	U
Triacontane (SS)		8.39 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-9

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB5#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	97.1	%
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64020G					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-10

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB5#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 25-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0010 mg/Kg	< 0.0010 mg/Kg	U
Toluene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Ethyl benzene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
m,p-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
o-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Methyl tertiary butyl ether	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Bromofluorobenzene (SS)		0.0602 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-10

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB5#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.4 mg/Kg	< 10.4 mg/Kg	U
Triacontane (SS)		9.10 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-10

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB5#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Total Solids	/1	0.01 %	96.3 %
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB			
QC Batch No : 64020G			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-11

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB4#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0010 mg/Kg	< 0.0010 mg/Kg	U
Toluene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Ethyl benzene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
m,p-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
o-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Methyl tertiary butyl ether	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Bromofluorobenzene (SS)		0.0641 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-11

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB4#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.3 mg/Kg	312 mg/Kg	
Triacotane (SS)		8.77 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-11

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB4#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED		DETECTION LIMIT	RESULTS FLAG
Total Solids	/1	0.01 %	96.7 %
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64021H			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-12

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB4#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 25-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0010 mg/Kg	< 0.0010 mg/Kg	U
Toluene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Ethyl benzene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
m,p-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
o-Xylene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Methyl tertiary butyl ether	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Bromofluorobenzene (SS)		0.0646 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-12

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB4#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.4 mg/Kg	< 10.4 mg/Kg	U
Triacotane (SS)		8.51 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-12

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB4#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	95.9	%
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64021H					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-13

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(6.5-7')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 25-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0011 mg/Kg	< 0.0011 mg/Kg	U
Toluene	0.0022 mg/Kg	< 0.0022 mg/Kg	U
Ethyl benzene	0.0022 mg/Kg	< 0.0022 mg/Kg	U
m,p-Xylene	0.0022 mg/Kg	< 0.0022 mg/Kg	U
o-Xylene	0.0022 mg/Kg	< 0.0022 mg/Kg	U
Methyl tertiary butyl ether	0.0022 mg/Kg	< 0.0022 mg/Kg	U
Bromofluorobenzene (SS)		0.0591 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-13

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(6.5-7')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.7 mg/Kg	< 10.7 mg/Kg	U
Triacontane (SS)		8.66 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-13

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(6.5-7')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED		DETECTION LIMIT	RESULTS FLAG
Total Solids	/1	0.01 %	93.1 %
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64021H			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-14

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0053 mg/Kg	< 0.0053 mg/Kg	DU
Toluene	0.0105 mg/Kg	< 0.0105 mg/Kg	DU
Ethyl benzene	0.0105 mg/Kg	< 0.0105 mg/Kg	DU
m,p-Xylene	0.0105 mg/Kg	< 0.0105 mg/Kg	DU
o-Xylene	0.0105 mg/Kg	< 0.0105 mg/Kg	DU
Methyl tertiary butyl ether	0.0105 mg/Kg	< 0.0105 mg/Kg	DU
Bromofluorobenzene (SS)		0.359 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-14

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 C1 /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0011 mg/Kg	< 0.0011 mg/Kg	U
Toluene	0.0021 mg/Kg	< 0.0021 mg/Kg	U
Ethyl benzene	0.0021 mg/Kg	0.124 mg/Kg	
m,p-Xylene	0.0021 mg/Kg	0.250 mg/Kg	
o-Xylene	0.0021 mg/Kg	0.262 mg/Kg	
Methyl tertiary butyl ether	0.0105 mg/Kg	< 0.0105 mg/Kg	U
Bromofluorobenzene (SS)		0.359 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-14

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 27-MAR-1997

ANALYSIS METHOD : EPA 8020 C2 /1

ANALYZED BY : MKS

ANALYZED ON : 27-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Ethyl benzene	0.0105 mg/Kg	< 0.0105 mg/Kg	DU
m,p-Xylene	0.0105 mg/Kg	< 0.0105 mg/Kg	DU
o-Xylene	0.0105 mg/Kg	< 0.0105 mg/Kg	DU
Bromofluorobenzene (SS)		0.369 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-14

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	52.5 mg/Kg	1570 mg/Kg	D
Triacontane (SS)		8.65 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-14

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	95.3	%
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64021H					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-15

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0052 mg/Kg	< 0.0052 mg/Kg	DU
Toluene	0.0104 mg/Kg	< 0.0104 mg/Kg	DU
Ethyl benzene	0.0104 mg/Kg	< 0.0104 mg/Kg	DU
m,p-Xylene	0.0104 mg/Kg	< 0.0104 mg/Kg	DU
o-Xylene	0.0104 mg/Kg	< 0.0104 mg/Kg	DU
Methyl tertiary butyl ether	0.0104 mg/Kg	< 0.0104 mg/Kg	DU
Bromofluorobenzene (SS)		0.402 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-15

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 26-MAR-1997

ANALYSIS METHOD : EPA 8020 C1 /1

ANALYZED BY : MKS

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0052 mg/Kg	< 0.0052 mg/Kg	DU
Toluene	0.0104 mg/Kg	< 0.0104 mg/Kg	DU
Ethyl benzene	0.0104 mg/Kg	0.111 mg/Kg	D
m,p-Xylene	0.0104 mg/Kg	0.309 mg/Kg	D
o-Xylene	0.0104 mg/Kg	0.283 mg/Kg	D
Methyl tertiary butyl ether	0.0104 mg/Kg	< 0.0104 mg/Kg	DU
Bromofluorobenzene (SS)		0.402 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-15

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 27-MAR-1997

ANALYSIS METHOD : EPA 8020 C2 /1

ANALYZED BY : MKS

ANALYZED ON : 27-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Ethyl benzene	0.0104 mg/Kg	< 0.0104 mg/Kg	DU
m,p-Xylene	0.0104 mg/Kg	< 0.0104 mg/Kg	DU
o-Xylene	0.0104 mg/Kg	< 0.0104 mg/Kg	DU
Bromofluorobenzene (SS)		0.669 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-15

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 27-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	52.0 mg/Kg	2270 mg/Kg	D
Triacontane (SS)		8.13 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-15

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB3#

: N1#(13-13.5')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	96.1	%
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64021H					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-16

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : FIELDQC#

: TB1#(0-0')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : VHT

PREPARED ON : 28-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : CNA

ANALYZED ON : 28-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0328802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	2.0 µg/L	< 2.0 µg/L	U
Toluene	2.0 µg/L	< 2.0 µg/L	U
Ethyl benzene	2.0 µg/L	< 2.0 µg/L	U
m,p-Xylene	2.0 µg/L	< 2.0 µg/L	U
o-Xylene	2.0 µg/L	< 2.0 µg/L	U
Methyl tertiary butl ether	2.0 µg/L	< 2.0 µg/L	U
Bromofluorobenzene (SS)		50.9 µg/L	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-17

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : FIELDQC#

: EB1#(0-0')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : VHT

PREPARED ON : 28-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : CNA

ANALYZED ON : 28-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0328802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	2.0 µg/L	< 2.0 µg/L	U
Toluene	2.0 µg/L	< 2.0 µg/L	U
Ethyl benzene	2.0 µg/L	< 2.0 µg/L	U
m,p-Xylene	2.0 µg/L	< 2.0 µg/L	U
o-Xylene	2.0 µg/L	< 2.0 µg/L	U
Methyl tertiary butl ether	2.0 µg/L	< 2.0 µg/L	U
Bromofluorobenzene (SS)		50.4 µg/L	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-17

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : FIELDQC#

: EB1#(0-0')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3510B

PREPARED BY : HCS

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-39

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		RESULTS
Total Extractable Hydrocarbons	1000	µg/L	< 1000 µg/L
Triacantane (SS)			200 µg/L

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-18

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: LB1#(0-0')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 25-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0010 mg/Kg	< 0.0010 mg/Kg	U
Toluene	0.0020 mg/Kg	< 0.0020 mg/Kg	U
Ethyl benzene	0.0020 mg/Kg	< 0.0020 mg/Kg	U
m,p-Xylene	0.0020 mg/Kg	< 0.0020 mg/Kg	U
o-Xylene	0.0020 mg/Kg	< 0.0020 mg/Kg	U
Methyl tertiary butyl ether	0.0020 mg/Kg	< 0.0020 mg/Kg	U
Bromofluorobenzene (SS)		0.0510 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-18

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: LB1#(0-0')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 25-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.0 mg/Kg	< 10.0 mg/Kg	U
Triacontane (SS)		8.13 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-19

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: BS1#(0-0')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 25-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0010 mg/Kg	0.0440 mg/Kg	
Toluene	0.0020 mg/Kg	0.0450 mg/Kg	
Ethyl benzene	0.0020 mg/Kg	0.0450 mg/Kg	
m,p-Xylene	0.0020 mg/Kg	0.0920 mg/Kg	
o-Xylene	0.0020 mg/Kg	0.0410 mg/Kg	
Methyl tertiary butyl ether	0.0020 mg/Kg	0.0390 mg/Kg	
Bromofluorobenzene (SS)		0.0500 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-19

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: BS1#(0-0')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.0 mg/Kg	84.1 mg/Kg	
Triacontane (SS)		9.10 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-20

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: MS1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 25-MAR-1997

DILUTION FACTOR : 5

METHOD FACTOR : 1

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0057 mg/Kg	0.296 mg/Kg	D
Toluene	0.0114 mg/Kg	0.288 mg/Kg	D
Ethyl benzene	0.0114 mg/Kg	0.252 mg/Kg	D
m,p-Xylene	0.0114 mg/Kg	0.501 mg/Kg	D
o-Xylene	0.0114 mg/Kg	0.236 mg/Kg	D
Methyl tertiary butyl ether	0.0114 mg/Kg	0.238 mg/Kg	D
Bromofluorobenzene (SS)		0.228 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-20

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: MS1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 10

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		RESULTS
			FLAG
Total Extractable Hydrocarbons	114	mg/Kg	2550 mg/Kg
			D
Triacontane (SS)			8.8 mg/Kg
			D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-20

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: MS1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	87.4	%
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64020G					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-21

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: SD1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MKS

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 25-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 5

QC BATCH NO : 0325802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.0057 mg/Kg	0.302 mg/Kg	
Toluene	0.0114 mg/Kg	0.296 mg/Kg	
Ethyl benzene	0.0114 mg/Kg	0.252 mg/Kg	
m,p-Xylene	0.0114 mg/Kg	0.534 mg/Kg	
o-Xylene	0.0114 mg/Kg	0.239 mg/Kg	
Methyl tertiary butyl ether	0.0114 mg/Kg	0.244 mg/Kg	
Bromofluorobenzene (SS)		0.231 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-21

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: SD1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 26-MAR-1997

DILUTION FACTOR : 10

METHOD FACTOR : 1

QC BATCH NO : AC052-34

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	114 mg/Kg	2690 mg/Kg	D
Triacontane (SS)		8.8 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-21

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : CB2#

: SD1#(8.5-9')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 21-MAR-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	87.4	%
Analyzed using ASTM D2216 mod. on 31-MAR-1997 by SAB QC Batch No : 64020G					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-22

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : LABQC#

: LB1#(0-0')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 22-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : VHT

PREPARED ON : 28-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : CNA

ANALYZED ON : 28-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0328802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	2.0 µg/L	< 2.0 µg/L	U
Toluene	2.0 µg/L	< 2.0 µg/L	U
Ethyl benzene	2.0 µg/L	< 2.0 µg/L	U
m,p-Xylene	2.0 µg/L	< 2.0 µg/L	U
o-Xylene	2.0 µg/L	< 2.0 µg/L	U
Methyl tertiary butyl ether	2.0 µg/L	< 2.0 µg/L	U
Bromofluorobenzene (SS)		50.8 µg/L	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-22

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : LABQC#

: LB1#(0-0')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 22-MAR-1997

PREPARATION METHOD : EPA 3510B

PREPARED BY : HCS

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 25-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-39

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		RESULTS
Total Extractable Hydrocarbons	1000	µg/L	< 1000 µg/L
Triacontane (SS)			222 µg/L

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-23

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudus

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : LABQC#

: BS1#(0-0')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 22-MAR-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : VHT

PREPARED ON : 28-MAR-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : CNA

ANALYZED ON : 28-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 0328802001

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	2.0 µg/L	53.1 µg/L	
Toluene	2.0 µg/L	53.3 µg/L	
Ethyl benzene	2.0 µg/L	53.6 µg/L	
m,p-Xylene	2.0 µg/L	118 µg/L	
o-Xylene	2.0 µg/L	54.5 µg/L	
Methyl tertiary butyl ether	2.0 µg/L	60.3 µg/L	
Bromofluorobenzene (SS)		49.3 µg/L	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 24-MAR-1997

REPORT NUMBER : D97-3469-23

REPORT DATE : 1-APR-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 9404 Genesee #140

: La Jolla, CA 92037

ATTENTION : Mr. Larry Dudas

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : LABQC#

: BS1#(0-0')

PROJECT : 726876.49123 AFCEE Bioventing

DATE SAMPLED : 22-MAR-1997

PREPARATION METHOD : EPA 3510B

PREPARED BY : HCS

PREPARED ON : 25-MAR-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 25-MAR-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC052-39

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 $\mu\text{g/L}$	2070 $\mu\text{g/L}$	
Triacotane (SS)		230 $\mu\text{g/L}$	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services Environmental Laboratories

DESCRIPTION OF REPORTING FLAGS

- U - Indicates compound was analyzed for but not detected.
- J - Indicates an estimated value. This flag is used if the compound is detected but is below the Reporting Limit.
- D - Indicates all compounds in an analysis at a secondary dilution.
- N - Indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds where the identification is based on a mass spectral library search.
- E - Indicates the compounds whose concentration exceed the limit of the instrument or the Laboratory Information Management System. The concentration will be greater than the concentration listed.
- Q - Indicates the surrogate recovery is outside the defined QC limits.
- M - Indicates the matrix has interfered with the recovery of the surrogates.
- O - Indicates the surrogate was lost because of dilution.



Intertek Testing Services
Environmental Laboratories

QUALITY CONTROL SUMMARY

ITS Intertek Testing Services Environmental Laboratories

REPORT DATE : 21-APR-1997

REPORT NUMBER : D97-3469

SAMPLE SUBMITTED BY : Parsons Engineering Science
ATTENTION : Mr. Larry Dudus

LABORATORY QUALITY CONTROL REPORT

ANALYTE	Methyl Tertiary Butyl Ether	Benzene	Ethyl benzene	Toluene	m,p-Xylene
BATCH NO.	0328802001	0328802001	0328802001	0328802001	0328802001
LCS LOT NO.	AB709-90A	AB709-90A	AB709-90A	AB709-90A	AB709-90A
PREP METHOD	EPA 5030	EPA 5030	EPA 5030	EPA 5030	EPA 5030
PREPARED BY	CNA	CNA	CNA	CNA	CNA
ANALYSIS METHOD	EPA 8020 PR	EPA 8020 PR	EPA 8020 PR	EPA 8020 PR	EPA 8020 PR
ANALYZED BY	CNA	CNA	CNA	CNA	CNA
UNITS	µg/L	µg/L	µg/L	µg/L	µg/L
METHOD BLANK	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
SPIKE LEVEL	500	500	500	500	1000
SPK REC LIMITS	75.0 - 125	75.0 - 125	75.0 - 125	75.0 - 125	75.0 - 125
SPK RPD LIMITS	25.0	25.0	25.0	25.0	25.0
MS RESULT	603	540	550	549	1210
MS RECOVERY %	121	108	110	110	121
MSD RESULT	592	490	494	490	1090
MSD RECOVERY %	118	98.0	98.8	98.0	109
MS/MSD RPD %	1.84	9.71	10.7	11.4	10.4
BS RESULT	NA	NA	NA	NA	NA
BS RECOVERY %	NA	NA	NA	NA	NA
BSD RESULT	NA	NA	NA	NA	NA
BSD RECOVERY %	NA	NA	NA	NA	NA
BS/BSR RPD %	NA	NA	NA	NA	NA
DUP RPD LIMITS	0.00	0.00	0.00	0.00	0.00
DUPLICATE RPD %	0.00	0.00	0.00	0.00	0.00
LCS LEVEL	50.0	50.0	50.0	50.0	100
LCS REC LIMITS	75.0 - 125	75.0 - 125	75.0 - 125	75.0 - 125	75.0 - 125
LCS RESULT	60.3	53.1	53.6	53.3	118
LCS RECOVERY %	121	106	107	107	118
SPIKE SAMPLE ID	3469-17	3469-17	3469-17	3469-17	3469-17
SAMPLE VALUE	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
DUP SAMPLE ID	---	---	---	---	---
DUP SAMPLE VAL/1	0.00	0.00	0.00	0.00	0.00
DUP SAMPLE VAL/2	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00

NA

Not applicable

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592

094

ITS Intertek Testing Services Environmental Laboratories

REPORT DATE : 2-MAY-1997

REPORT NUMBER : D97-3469

SAMPLE SUBMITTED BY : Parsons Engineering Science
ATTENTION : Mr. Larry Dudus

LABORATORY QUALITY CONTROL REPORT

ANALYTE	o-Xylene	Methyl Tertiary Butyl Ether	Benzene	Ethyl benzene	Toluene
BATCH NO.	0328802001	0325802001	0325802001	0325802001	0325802001
LCS LOT NO.	AB709-90A	AB709-90A	AB709-90A	AB709-90A	AB709-90A
PREP METHOD	EPA 5030	EPA 5030	EPA 5030	EPA 5030	EPA 5030
PREPARED BY	CNA	MKS	MKS	MKS	MKS
ANALYSIS METHOD	EPA 8020 PR	EPA 8020 PR	EPA 8020 PR	EPA 8020 PR	EPA 8020 PR
ANALYZED BY	CNA	MKS	MKS	MKS	MKS
UNITS	µg/L	mg/Kg	mg/Kg	mg/Kg	mg/Kg
METHOD BLANK	< 2.00	< 0.00200	< 0.00100	< 0.00200	< 0.00200
SPIKE LEVEL	500	0.250	0.250	0.250	0.250
SPK REC LIMITS	75.0 - 125	70.0 - 130	70.0 - 130	70.0 - 130	70.0 - 130
SPK RPD LIMITS	25.0	25.0	25.0	25.0	25.0
MS RESULT	560	0.208	0.259	0.220	0.252
MS RECOVERY %	112	83.2	104	88.0	101
MSD RESULT	503	0.213	0.264	0.220	0.259
MSD RECOVERY %	101	85.2	106	88.0	104
MS/MSD RPD %	10.7	2.38	1.91	0.00	2.74
BS RESULT	NA	NA	NA	NA	NA
BS RECOVERY %	NA	NA	NA	NA	NA
BSD RESULT	NA	NA	NA	NA	NA
BSD RECOVERY %	NA	NA	NA	NA	NA
BS/BSD RPD %	NA	NA	NA	NA	NA
DUP RPD LIMITS	---	---	---	---	---
DUPLICATE RPD %	NA	NA	NA	NA	NA
LCS LEVEL	50.0	0.0500	0.0500	0.0500	0.0500
LCS REC LIMITS	75.0 - 125	70.0 - 130	70.0 - 130	70.0 - 130	70.0 - 130
LCS RESULT	54.5	0.0390	0.0440	0.0450	0.0470
LCS RECOVERY %	109	78.0	88.0	90.0	94.0
SPIKE SAMPLE ID	3469-17	3469-2	3469-2	3469-2	3469-2
SAMPLE VALUE	< 2.00	< 0.00200	< 0.00100	< 0.00200	< 0.00200
DUP SAMPLE ID	---	---	---	---	---
DUP SAMPLE VAL/1	---	---	---	---	---
DUP SAMPLE VAL/2	---	---	---	---	---

NA

Not applicable

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592



Intertek Testing Services

Environmental Laboratories

REPORT DATE : 21-APR-1997

REPORT NUMBER : D97-3469

SAMPLE SUBMITTED BY : Parsons Engineering Science
ATTENTION : Mr. Larry Dudus

LABORATORY QUALITY CONTROL REPORT

ANALYTE	m,p-Xylene	o-Xylene	Total Petroleum Hydrocarbon	Total Petroleum Hydrocarbon
BATCH NO.	0325802001	0325802001	AC052-39	AC052-34
LCS LOT NO.	AB709-90A	AB709-90A	AB988-52	AB988-52
PREP METHOD	EPA 5030	EPA 5030	EPA 3510B	EPA 3550A
PREPARED BY	MKS	MKS	HCS	CLT
ANALYSIS METHOD	EPA 8020 PR	EPA 8020 PR	EPA 8015M	EPA 8015M
ANALYZED BY	MKS	MKS	VHL	VHL
UNITS	mg/Kg	mg/Kg	mg/L	mg/Kg
METHOD BLANK	< 0.00200	< 0.00200	< 0.100	< 2.00
SPIKE LEVEL	0.500	0.250	2.50	83.3
SPK REC LIMITS	70.0 - 130	70.0 - 130	35.0 - 115	30.0 - 150
SPK RPD LIMITS	25.0	25.0	25.0	25.0
MS RESULT	0.438	0.206	NA	2230
MS RECOVERY %	87.6	82.4	NA	1060 F
MSD RESULT	0.437	0.209	NA	2350
MSD RECOVERY %	87.4	83.6	NA	912 F
MS/MSD RPD %	0.23	1.45	NA	14.6 F
BS RESULT	NA	NA	2.07	84.1
BS RECOVERY %	NA	NA	82.8	101
BSD RESULT	NA	NA	1.86	80.5
BSD RECOVERY %	NA	NA	74.4	96.6
BS/BSD RPD %	NA	NA	10.7	4.37
DUP RPD LIMITS	0.00	0.00	---	---
DUPLICATE RPD %	0.00	0.00	NA	NA
LCS LEVEL	0.100	0.0500	---	---
LCS REC LIMITS	70.0 - 130	70.0 - 130	---	---
LCS RESULT	0.0920	0.0410	SEE_BS	SEE_BS
LCS RECOVERY %	92.0	82.0	SEE_BS	SEE_BS
SPIKE SAMPLE ID	3469-2	3469-2	---	3469-2
SAMPLE VALUE	< 0.00200	< 0.00200	---	3110
DUP SAMPLE ID	---	---	---	---
DUP SAMPLE VAL/1	0.00	0.00	---	---
DUP SAMPLE VAL/2	< 0.00200	< 0.00200	---	---

NA
SEE_BS
_F

Not applicable
LCS and LCS Duplicate reported as BS and BSD.
Not applicable due to high analyte concentration in the QC sample.